ATI X800 XT Platinum Edition & X800 Pro Reviewed—Full Benchmarks On Page 20!

A Sandhills Publication

CPU®
COMPUTER POWER USER

Q&A With CliffyB

The Genius Behind Unreal Tournament Shares His Gaming Goals

(page 108)

Extreme
Controllers On Parade
(page 16)

Make The Old Sound New
Tips For Editing Your Audio Archives
(page 97)

Use The Internet
To Find The Job Of Your Dream
(page 82)

HANDS ON NETWORKING

page 50

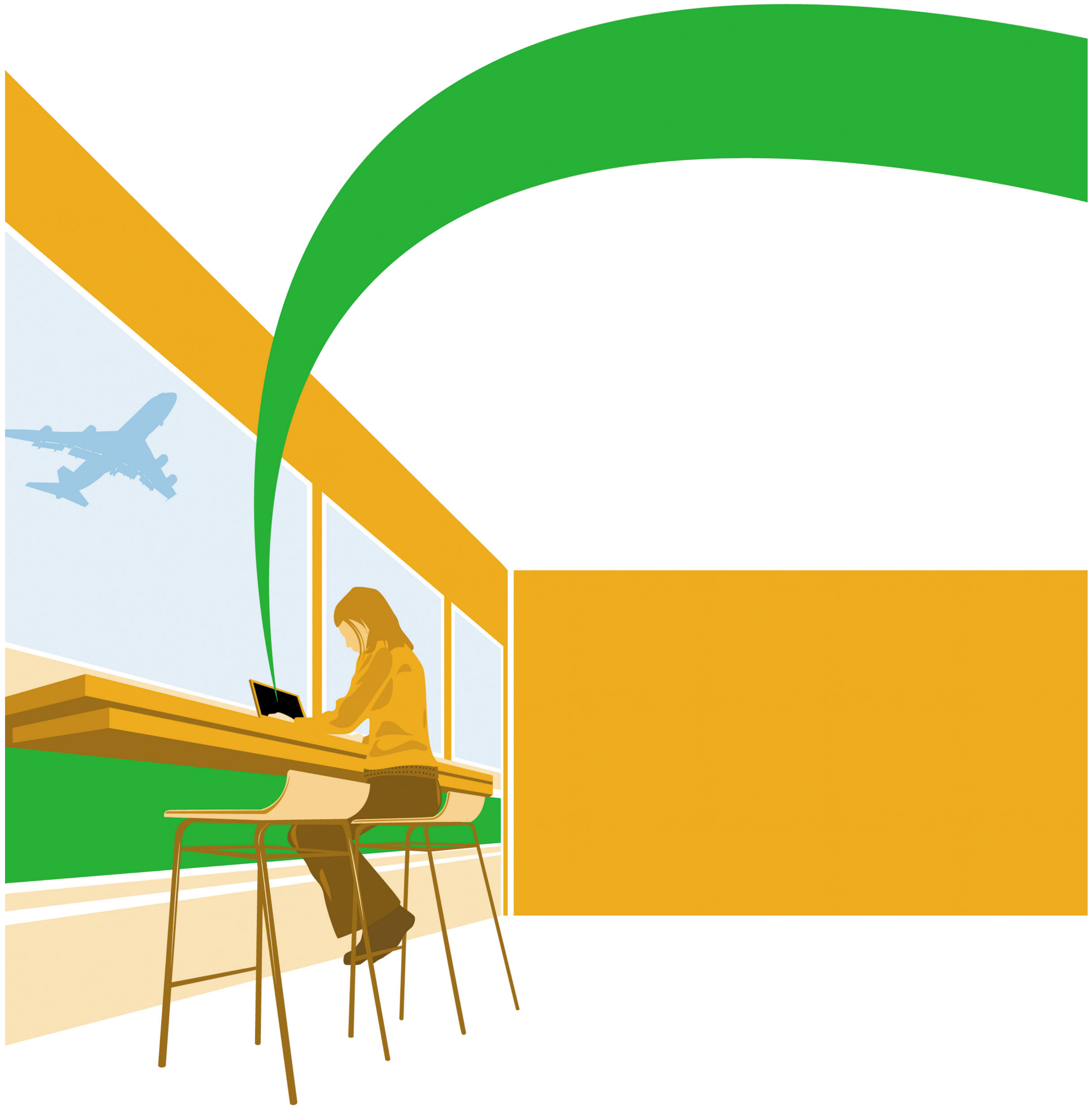
WiMax
Broadband Without Wires

page 42

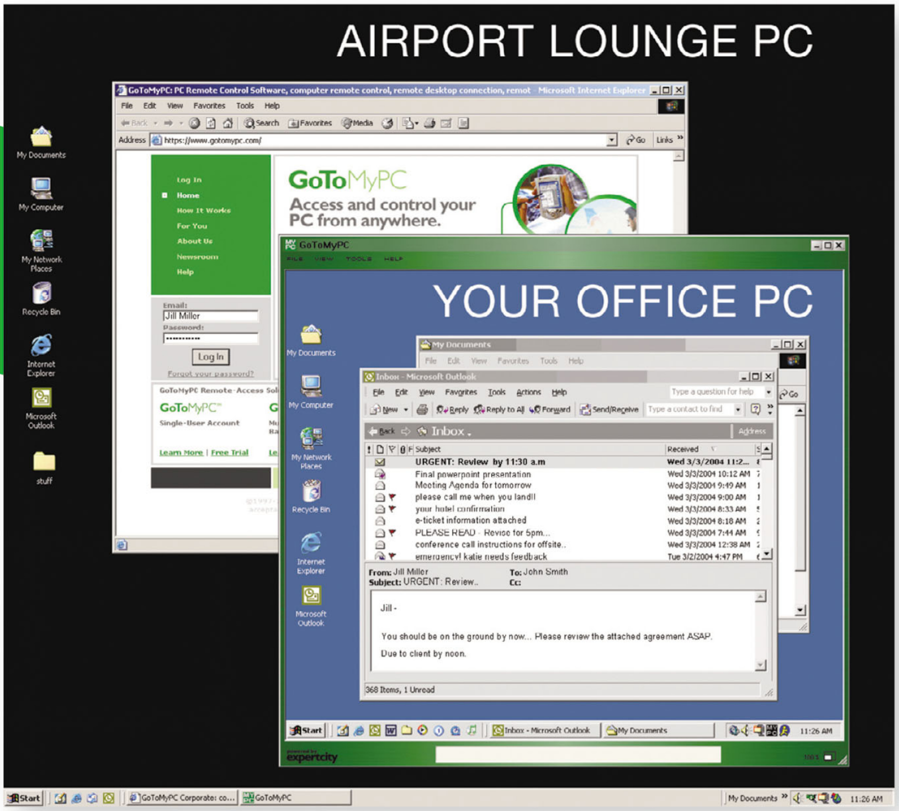
See Voodoo's Raging F:50 PC On Page 36

July 2004 • Vol. 4 Iss. 7

$5.99 U.S.
$7.99 Canada



GoToMyPC®


AIRPORT LOUNGE PC
GoToMyPC
Access and control your PC from anywhere.
YOUR OFFICE PC
Inbox - Microsoft Outlook
My Documents

Subject	Received
URGENT: Review by 11:30 a.m	Wed 3/3/2004 11:2...
Final powerpoint presentation	Wed 3/3/2004 10:12 AM
Meeting Agenda for tomorrow	Wed 3/3/2004 9:49 AM
please call me when you land!!	Wed 3/3/2004 9:00 AM
your hotel confirmation	Wed 3/3/2004 8:33 AM
e-ticket information attached	Wed 3/3/2004 8:18 AM
PLEASE READ - Revise for 5pm...	Wed 3/3/2004 7:44 AM
conference call instructions for offsite..	Wed 3/3/2004 12:38 AM
emergency! katie needs feedback	Tue 3/2/2004 4:47 PM

From: Jill Miller To: John Smith
Subject: URGENT: Review.. Cc:

Jill -

You should be on the ground by now... Please review the attached agreement ASAP.

Due to client by noon.

368 Items, 1 Unread

You're sitting in the **airport lounge**...
your flight is delayed.

You remember there's a presentation
you need to edit on your **office PC**.

You find a comfortable spot in front of a PC in the airport lounge and log on to **gotomypc.com**.

Your office PC desktop instantly appears on the screen in front of you, just as if you were sitting at your desk back at work. With a relaxed smile, you access and work on the presentation you needed and respond to some urgent emails.

With GoToMyPC, using any computer connected to the Internet, or a handheld wireless device, you can always have complete and secure access to everything on your PC from anywhere in the world.

"You'd be nuts not to sign up!" — CNET

Free 30-Day Trial
gotomypc.com/cpu
866.270.1212

CPU
COMPUTER POWER USER®

July 2004 • Vol 4 Issue 7

Frontside

6 **What's Happening**
12 **Digital Economy**
14 **The Saint**
Spyware 3.0: Last Word On "Removeware"

The Experts

Alex St. John
The Saint
page 14

Alex "Sharky" Ross
The Shark Tank
page 27

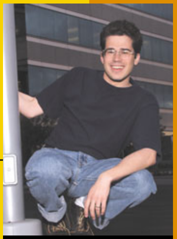
Joan Wood
Forward Slash
page 89

Anand Lal Shimpi
Anand's Corner
page 26

Rob "CmdrTaco" Malda
The Department Of Stuff
page 88

Kyle Bennett
[H]ard Talk
page 28

Mike Magee
Shavings From The Rumour Mill
page 102


Chris Pirillo
Dialogue Box
page 79

Pete Loshin
Open Sauce
page 80

Spotlight

50 **Networking**
The Big Picture

56 **DIY Networking**
Tips, Tutorials & Advice For Hooking Your Systems Up

66 **Build Your Next-Gen Network Now**
Getting To Know The Tools Of The Trade

Copyright 2004 by Sandhills Publishing Company. *Computer Power User* is a trademark of Sandhills Publishing Company. All rights reserved. Reproduction of material appearing in *Computer Power User* is strictly prohibited without written permission. Printed in the U.S.A. GST # 123482788RT0001 (ISSN 1536-7568) *CPU Computer Power User* USPS 020-801 is published monthly for $29 per year by Sandhills Publishing Company, 131 West Grand Drive, P.O. Box 82667, Lincoln, NE 68501. Subscriber Services: (800) 424-7900. Periodicals postage paid at Lincoln, NE. POSTMASTER: Send address changes to *Computer Power User*, P.O. Box 82667, Lincoln, NE 68501.

Did you find the hidden CPU logo on our cover? Turn the page for the answer.

Heavy Gear

15 **Dream Hardware**

16 **Controllers On Parade**
Your Computing Life Just Got Easier

20 **ATI's Next Wave**
Radeon X800 XT Platinum Edition & X800 Pro

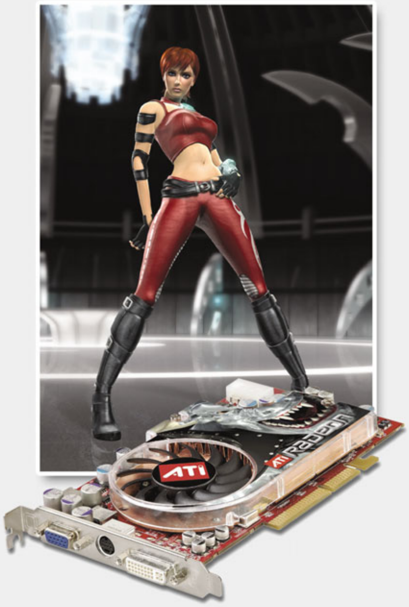
23 OCZ 520ADJ Power Supply
LG L2320A LCD Display

25 SOYO SY-P4I875P DRAGON 2 v1.0 Black Label
VIA EPIA MII12000 Mini-ITX

26 **Anand's Corner**
Saying "I Do-than"

27 **The Shark Tank**
The 3D Land Of Confusion

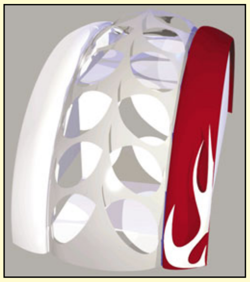
28 **[H]ard Talk**
PCI Express For Yourself?



Hard Hat Area

30 **PC Modder**
Tips & Tutorials

31 **Building "Spike"**
The Diary Of A Modder's Creation, Part I



36 **Dream PC**
Voodoo PC Rage F:50
40 Advanced Q&A Corner
42 **X-ray Vision**: WiMAX
Broadband By Air
44 **White Paper:** ATI X800 Series
The R420 Brings New Technologies

Loading Zone

70 **The Bleeding Edge Of Software**
Inside The World Of Betas
72 **Up To Speed**
Upgrades That'll Keep You Humming Along
73 **From The Amateur To Pro**
Video-Editing Apps That Offer The Basics & Beyond
76 321 Studios GamesXCopy 9
MixMeister Technology MixMeister Express 5
78 iolo Technologies System Mechanic Pro 4.0
WinZip Computing WinZip 9.0
79 **Dialogue Box**
Personal Homeland Security
80 **Open Sauce**
Fun & Games

Caught In The Web

82 **Surfing The Classifieds**
Get Results From Your Online Job Search

86 **Coder's Corner: XML**
Introduction To XML Schema
88 **The Department Of Stuff**
spectrum.txt
89 **Forward Slash**
The Girls Of Xerox PARC

Digital Living

90 **Road Warrior**
Intel Unleashes Dothan, New Palms & PowerBooks, Wireless Beamers & More From The Mobile Front
92 **At Your Leisure**
Plug In, Sit Back & Fire Away

Tips & Tricks

97 **Software Tips & Projects**
Editing Audio Archives
99 **Warm Up To Penguins**
Auto-Starting GUI Applications

What's Cooking

102 **Shavings From The Rumour Mill**
AMD's Chance To Rake In Money
103 **Technically Speaking**
An Interview With Curt Marvis, CinemaNow's Main Movie Man
106 **Under Development**
A Peek At What's Brewing In The Laboratory

Back Door

108 **Q&A With CliffyB**
Lead Designer, Epic Games

Infinite Loops

Strange stats and other oddball items from computing's periphery

84, 95, 98, 100

GREETINGS FROM SAMITLAND

Breaking a sweat and thinking that head- and wrist sweat bands are in vogue again? Heat got your tongue parched? Look mate, I'm a cold-weather chap, so I feel your pain. Summertime has me skulking in the cool darkness of my office whilst grousing at Julie to close the blinds. Sunlight is sometimes so overrated. What's a lad to do with all that time spent indoors? Well, I think we can help you there. So, let's quit with the palaver and get on to the good stuff.

Head over to page 56 to check out the networking how-to projects we've put together for you this month. These are targeted at multiple difficulty levels, plus there are tips for Apple OS X and Linux users. I know networking isn't exactly sexy, but it's vital to nearly anyone who has more than one PC. In addition to impressing friends and family with remotely streaming movies and music, you'll learn how to keep out uninvited cyber guests, manipulate your ports, use the DMZ, extend wireless connectivity, set up dual NICs, run your own dedicated game server, and more. When you come up for air, you can learn about setting up a Gigabit backbone for that ultimate connected home.

In addition to all that, we have a solid look at the ATI X800 XT Platinum Edition and X800 Pro on page 20, followed by a look at X800 technologies in "White Paper" on page 44. (**Late-breaking news as we go to press**: I just heard that ATI will have PCI Express graphics cards available simultaneously with Intel's Grantsdale release [date not finalized]. Expect two flavours of the X800 and perhaps X600 along with a 0.11 micron X300. We'll have more details later.) There's a three-part diary on the "Spike" project starting on page 31 for you advanced builders, as well as that awe-inspiringly silent Voodoo PC on page 36. I could go on, but you catch my drift, right? There's plenty in these pages to keep you entertained while you hide indoors from the heat outside.

Well, it's back to listening to The Pixies and daydreaming of Caipirinhas and top-notch cuts of meat at a Brazilian steakhouse in Chicago (where I had dinner with my extended family) called Fogo de Chão. It's a restaurant for carnivores but offers an excellent salad bar for leaf-friendly patrons. It's so very good—in fact, almost as good as playing with technology the way we do all day long. Relax, I said, "almost." I know this is way OT, but the restaurant has been like a siren calling my name. Fortunately, *CPU*'s readers call far more raucously via emails and CPUmag.com forum postings. Yeah, we like raucous so it's back to toiling. Take care; I look forward to seeing you back here next month.

Samit G. Choudhuri, Publication Editor, *CPU*

Sandhills
Publishing

Customer Service
(For questions about your subscription or to place an order or change an address.)
customer-service@cpumag.com
800-733-3809
FAX: (402) 479-2193
Computer Power User
P.O. Box 82667
Lincoln, NE 68501-2667

Hours
Mon. - Fri.: 7 a.m. to 8 p.m. (CST)
Sat.: 8 a.m. to 4 p.m. (CST)
Online Customer Service & Subscription Center
http://www.cpumag.com

Web Services
(For questions about our Web site.)
webhelp@cpumag.com
(800) 368-8304

Authorization For Reprints
(800) 334-7458
FAX: (402) 479-2104

Editorial Staff
editor@cpumag.com
FAX: (402) 479-2104
131 W. Grand Drive
Lincoln, NE 68521

Subscription Renewals
(800) 382-4552
FAX: (402) 479-2193
http://www.cpumag.com

Advertising Staff
(800) 848-1478
120 W. Harvest Dr.
Lincoln, NE 68521
FAX: (402) 479-2193

The Gang

Editorial Staff: Ronald D. Kobler / Samit Gupta Choudhuri / Jennie Schlueter / Blaine Flamig / Corey Russman / Rod Scher / Christopher Trumble / Calvin Clinchard / Kimberly Fitzke / Katie Dolan / Raejean Brooks / Rebecca Christensen / Tara Weber / Sally Curran / Michael Sweet / Katie Crooks / Shawn Kupfer / Dana Montey / Nate Hoppe / Sheila Allen / Jennifer Hansen / Trista Kunce / Marty Sems / Chad Denton / Nathan Chandler / Kylee Dickey / Josh Gulick / Andrew Leibman / Eric Reed / Vince Cogley **Web staff:** Missy Fletcher / Dorene Krausnick / Nick Ray **Customer Service:** Alisha Lamb / Brandie Humphrey / Becky Rezabek / Lana Matic **Subscription Renewals:** Liz Kohout / Connie Beatty / Matt Bolling / Patrick Kean / Charmaine Vondra / Miden Ebert / Kathy DeCoito / Stephanie Contreras / Nicole Buckendahl / Travis Brock **Art & Design:** Lesa Call / Fred Schneider / Carrie Benes / Ginger Riley / Sonja Warner / Leigh Trompke / Aaron Weston / Aaron Clark / Lori Garris / Jason Codr / Andria Schultz / Erin Rodriguez / Lindsay Anker **Newsstand:** Garth Lienemann / Kelly Richardson / Chris McGreer / Jeff Schnittker **Advertising Sales:** Grant Ossenkop / Cindy Pieper / Brooke Wolzen / Eric Cobb / Emily Getzschman **Marketing:** Mark Peery / Marcy Gunn / Heather Mentgen / Amber Coffin / Jen Clausen

CORRECTIONS

On page 37 of the May issue, we noted that Grantsdale's ICH6-R southbridge will offer eight serial ATA ports. We beg you to slap us silly; it should be four.

Gotcha. Here it is.

Susan will make sure you're comfy with your Anthro choice.

Yes, life can be this good. You, your laptop, and a comfy place to work (that's the part Anthro supplies). What more could you need? All Anthro furniture is modular and flexible, so we're delighted to help find the right fit for you. Tell us about your furniture challenges and we'll configure choices for you to consider. (Did we mention our Lifetime Warranty?) Contact our helpful folks at **Anthro.com or 800-325-3841.**

ANTHRO®
TECHNOLOGY FURNITURE®
-Fast and Friendly!

GSA contract. Available for OEM applications.

Compiled by Steve Smith

N-Gage QD: Second Time's A Charm?

After the N-Gage suffered one of the worst product launches in recent memory, Nokia's N-Gage QD actually seems to answer many of the original unit's glaring problems. The QD now places the MMC memory slot on the outside rather than inside of the N-Gage, while the buttons have been repositioned sensibly and made more responsive. Best of all, the price is now a more reasonable $199 (down by $100) and perhaps as low as $99 when bundled with mobile phone services. Nokia has also changed the curious shape of the original N-Gage, as well as the positioning of the ear and mouthpieces, so that users no longer seem to be talking into the wrong side of a taco when they use it as a phone. ▲

The Passing Of The PDA?

The PDA is being challenged for consumer pocket share by ever-more versatile smartphones as worldwide sales of PDAs declined 11.7% in the first quarter of 2004 from the same period in 2003. At the high end of the market, buyers are starting to opt for handhelds that also incorporate phone service, and so in an otherwise down period, PalmOne saw its greatest sales growth from the Treo 600 PDA/phone combo. In general, however, the Microsoft Pocket PC is catching up to the once-dominant PalmOS. Gartner Dataquest recently reported that Palm and Pocket PC are now in a dead heat, with each running roughly 40% of recently shipped PDAs. Most analysts do expect Palm to stage a comeback, however, as it releases the hotly anticipated next iteration of its OS along with new models later this year. ▲

SCREENS SIMULATED

Alienware Claims Other-Worldly Speed Gains

Alienware, one of the pioneers of the high-end performance PC market, succeeded in jolting the gaming community at the recent E3 in Los Angeles with the announcement of its upcoming ALX family of PCs available later this year. Promising speed gains of 50% or more over current top-end machines, the ALX line will incorporate a dual processor "X2" motherboard, as well as a unique dual graphics card solution. Dubbed the "Video Array," the architecture uses two PCI Express graphics slots to run dual video cards. According to this scheme, the two cards do not have to be identical, but each one renders half of the required screen image. A third PCI "array" card assembles them into a full screen that is sent to the display. The X2 motherboards for this dual-processor, dual-graphics card monster system come from Iwill and include support for Intel Xeon processors and up to 8GB of DDR3 system RAM. Alienware will not be licensing this technology, so those with an obsessive need for speed will have to buy direct from the little green guys. ▲

SATA Drives Get Faster, Smarter

NCQ (Native Command Queuing) is poised to push Serial ATA hard drives to new levels of performance by letting a drive reorder and reschedule commands so that it retrieves the requested information in the most efficient way possible. In tests, a Seagate Barracuda 7,200rpm drive used SATA NCQ technology to equal or surpass the performance of a 10,000rpm drive, according to Seagate. NCQ tracks the current position of the drive heads so that it moves to the next closest piece of requested data before moving to another part of the platter. In addition to being faster, these drives could also prove more reliable than previous generations of storage because they reduce wear and tear on a drive's mechanical parts. The Seagate Barracuda 7200.7 SATA with NCQ should be shipping to OEMs now. ▲

Hardware Mole

Sony's Professional Disc For Data

Sony recently introduced the Professional Disc for Data, a 23GB rewriteable disc and drive that use blue laser light to carve data onto discs at four times the densities of current DVDs. The new discs and drives are aimed at professional services such as libraries for high-capacity archiving. Sony's Blu-ray storage discs are similar but are oriented for the consumer market; they are currently being test-marketed in Japan. The single-sided Professional Disc for Data discs cost $45 but render 11MBps read and 9MBps write speeds. Sony anticipates that the next generation of blue laser drives in 2005 will handle 50GB per disc at 22MBps read times and double those capacities and speeds by 2007. ▲

Sony's Professional Disc for Data uses a blue laser instead of red laser technology.

The DocuPen: Why Write When You Can Scan?

Our gotta-have gadget of the month must be Planon Systems' (www.planon.com) DocuPen, a full-page scanner for your pocket. This $199 device is about 8 inches long and half an inch wide. Swiping it down a page in four to eight seconds renders an image of up to 200 x 200 dpi. The 2MB of flash memory stores up to 100 pages until you connect the DocuPen to a PC's USB port. Bundled image and OCR software lets you edit or convert your scans into text. Imagine if James Bond had carried around one of these things instead of those clunky microfilm cameras. Why didn't Q think of this first? ▲

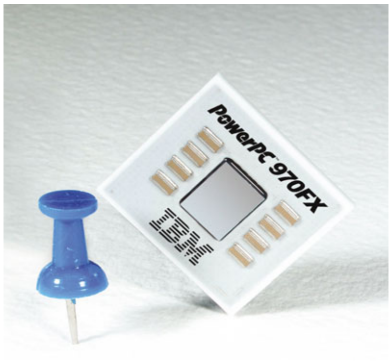
The $199 DocuPen is the most portable full-page scanner available outside of Q's spy workshop.

Broadband Takes To The Air

Someday searching for a Wi-Fi hostpot will seem as outdated and quaint as churning your own butter. Why make a special trip to Starbucks to jack into T-Mobile when you can crack open your notebook anywhere and log in at cable modem speeds? Mobile broadband Internet access got one step closer to reality in early 2004 with initial trials of Nextel Wireless Broadband (www.nextelbroadband.com) in the North Carolina Research Triangle area. Nextel's wireless modems pull up to a 1.5MBps download speed anywhere in a 1,300 square mile service area around Raleigh, Chapel Hill, and Durham. Now that's a hotspot. Monthly fees range from $34.99 to $74.99, but the company has not revealed a timetable for broader U.S. rollouts. ▲

Compiled by Dean Takahashi

IBM's eServer iSeries Servers Sport New Power5 Microprocessors



Big Blue's latest microprocessor, the Power5, is the brain of the new i5 520 and i5 570 servers.

After $500 million in development expenses and more than two years of design, IBM has released its Power5 microprocessors and the first line of servers that will use them. The chips run at 1.65GHz and perform about twice as fast as the Power4 microprocessors released in 2002. The new chips are being used in IBM's i5 520 server starting at $9,995 and i5 570 server starting at $85,200. The Power5 is a 64-bit microprocessor with 276 million transistors, compared to 170 million in the Power4. Among its features is the ability to partition itself into 10 different systems, meaning it can run up to 10 different operating systems and their applications at the same time. Al Zollar, general manager of the iSeries server products at IBM, says this virtualization engine will bring one of the features of mainframe computing to servers: the ability to use the server as much as 90% of the time, compared to current utilization rates as low as 5%. ▲

Broadcom Boosts Wi-Fi Range

Broadcom dominates the market for Wi-Fi chips, and it isn't planning on losing its edge. The Irvine, Calif., chipmaker has released a power amplifier that the company says can increase the range of 802.11g wireless networks by as much as 50%. That means a wireless access point that used to have a range of 100 to 150 feet will now have a range of 150 to 225 feet, according to Jeff Abramowitz, senior director of WLAN marketing at Broadcom. The power amplifier also reduces the cost of a Wi-Fi solution by as much as 20% to 30%. Meanwhile, the company also created software that simplifies the setup of a Wi-Fi access point. SecureEZSetup includes a wizard that asks a user to input the answers to two security questions and then it automatically configures the network for secure operation. An 802.11g network can transmit data wirelessly at a speed of 54Mbps, but Broadcom's chips also have a proprietary mode that boosts the speed to 125Mbps. ▲

Wal-Mart Initiates RFID Inventory Tracking System

Wal-Mart has begun putting radio frequency identification tags on 21 products and reading the data from the tags in seven stores in the Dallas area. Simon Langford, manager of RFID strategy at the Bentonville, Ark.,-based retailer, says that the tags include passive radio chips operating at 13.96MHz that can be read from a range of 10 to 15 feet. The passive tags do not require batteries and as such are considered a good replacement for the ubiquitous bar code. Retailers like the tags because they help them keep track of inventory throughout their supply chains and also keep store shelves from running out of products. Wal-Mart will require its top 100 suppliers to use RFID tags on pallets and cases by the beginning of 2005. According to AMR Research, RFID is expected to be a $20 billion market that includes readers, tags, antennae, servers, network equipment, software, and services by 2013. ▲

Watching The Chips Fall

Here is pricing information for AMD and Intel CPUs.

Released	Original Price	Current Price (10/14/03)	Last Month's Price
AMD Athlon XP 2600+			
8/21/2002	$297**	$77	$79
AMD Athlon XP 2700+ 333MHz FSB			
11/14/2002	$349**	$97	$97
AMD Athlon XP 2800+ 333MHz FSB			
11/14/2002	$397**	$100	$106
AMD Athlon XP 3000+ 333MHz FSB			
2/10/2003	$634*	$130	$143
AMD Athlon XP 3000+ 400MHz FSB			
5/26/2003	$280*	$150	$165
AMD Athlon XP 3200+ 400MHz FSB			
5/26/2003	$464**	$179	$205
AMD Athlon 64 2800+			
1/6/2004	$193**	$170	$173
AMD Athlon 64 3000+			
9/23/2003	$218**	$211	$211
AMD Athlon 64 3200+			
9/23/2003	$417**	$270	$270
AMD Athlon 64 3400+			
1/6/2004	$417**	$404	$405
AMD Athlon 64 FX-53			
3/18/2004	$733**	$745	$745
Intel Pentium 4 2.53GHz 533MHz FSB			
5/6/2002	$637	$171	$168*
Intel Pentium 4 2.6GHz 800MHz FSB			
5/21/2003	$228*	$174*	$177*
Intel Pentium 4 2.66GHz 533MHz FSB			
8/26/2002	$401**	$173*	$161*
Intel Pentium 4 2.8GHz 533MHz FSB			
8/26/2002	$508**	$141	$162*
Intel Pentium 4 2.8GHz 800MHz FSB			
5/21/2003	$278*	$182	$179*
Intel Pentium 4 2.8GHz 800MHz FSB 1MB cache			
2/2/2004	$178**	$173	$184*
Intel Pentium 4 3.06GHz 533MHz FSB			
11/14/2002	$658*	$218	$209
Intel Pentium 4 3GHz 800MHz FSB			
4/21/2003	$417**	$212	$209*
Intel Pentium 4 3GHz 800MHz FSB 1MB cache			
2/2/2004	$218**	218*	$233*
Intel Pentium 4 3.2GHz 800MHz FSB			
6/23/2003	$637**	$276*	$280*
Intel Pentium 4 3.2GHz 800MHz FSB 1MB cache			
2/2/2004	$278**	$278	$278
Intel Pentium 4 3.4GHz 800MHz FSB			
2/2/2004	$417**	$419*	$416*
Intel Pentium 4 Extreme Edition 3.2GHz 2MB cache 800MHz FSB			
11/3/2003	$925**	$845	$949*
Intel Pentium 4 Extreme Edition 3.4GHz 2MB cache 800MHz FSB			
2/2/2004	$999**	$1,079*	$1,079*

* Retail price
** Manufacturer's price per 1,000 units
Other current prices, if indicated, are lowest OEM prices available through Pricegrabber.com.

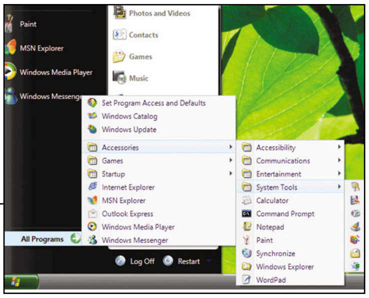
Pac-Man In The City

NYU graduate students played a game of Pac-Man in the streets of Greenwich Village in May to demonstrate how virtual gameplay might translate to real-world street action. But why?

Now that the babes of "Sex And The City" are gone, Manhattanites seem hungry for alternative entertainment. Billing itself as a "large-scale urban game," Pacmanhattan (www.pacmanhattan.com) played Pac-Man with humans on the streets of Greenwich Village in early May. You guessed it: Only academics would do something this silly. Graduate students at New York University's Interactive Telecommunications project dressed one of their number as Pac-Man to go munch four others dressed as Ghosts. Five human controllers communicated with the players via cell phones, charting everyone's position on a familiar Pac-Man grid on the Web. Why did they do this? They wanted to discover how virtual game reality would translate into real-world activity on the street. And why would they want to know this? We couldn't figure that one out, but perhaps we're just the kind of annoying undergrads who ask the TAs too many damn questions. ▲

The "Aero" interface for the next generation of Windows will use 3D shapes and transparencies, according to the level of hardware on which it runs.

(PHOTO COURTESY OF SUPERSITE FOR WINDOWS; WWW.WINSUPERSITE.COM)



Longhorn's Look Will Depend On Your Hardware

Breaking with a long tradition of keeping its operating system interfaces independent of hardware capabilities, Microsoft announced at the recent WinHEC that the next version of Windows (codenamed Longhorn) will sport different interfaces for three levels of hardware. Low-end PCs without speedy graphics accelerators will get a "classic" look that resembles today's Windows 2000, while midlevel machines with 3D accelerators and 32MB of memory will use the "Aero" interface that includes 3D objects. The upper-tier "Aero Glass" for 64MB of video memory will include transparent effects and advanced 3D shading. Longhorn is not expected to launch until the middle of 2006. ▲

Software Shorts

Who You Sampling, Gamer Boy?

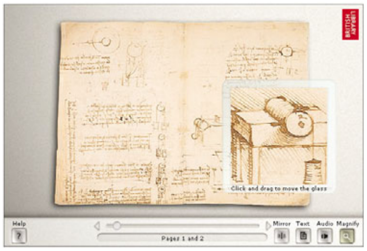
Music megapublisher EMI is suing the world's biggest game publisher, Electronic Arts, for using some of its songs without permission in sports titles such as Madden NFL 2004 and Tiger Woods PGA Tour 2004. EA counters that the suit involves a misunderstanding about one properly licensed song from another publisher that happened to sample from lyrics in an EMI tune. EMI argues that EA released games containing its tracks before permission had been granted. As the fortunes of the music industry decline while gaming revenues soar, expect record companies to do all they can to squeeze what they can from the marriage of games and music. ▲

Tablet OS Looks To 2005 & Beyond

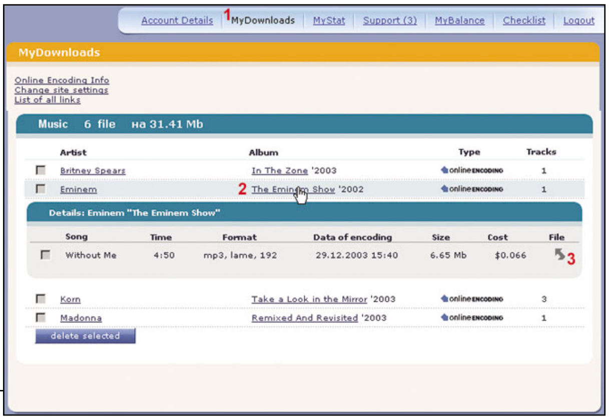
In the coming months, Microsoft will release Windows XP Tablet Edition 2005, which will have much-improved handwriting recognition tools and tighter integration with Office and OneNote. Further down the road, Microsoft is looking to make the Tablet a more practical media playback device by letting it transfer and play entertainment media faster. The company is also planning to allow file names made with inked letters and symbols and to provide an instant wireless collaboration environment for Tablets and notebooks in the same vicinity. ▲

Turning The Virtual Page

The British Library just made available to other libraries and archival institutions software that lets users thumb through priceless manuscripts virtually. Turning The Pages re-creates manuscripts so users can turn each page, zoom in for detail, and hear audio accompaniment. You can use the software on the desktop, the Web, or a touchscreen kiosk at libraries and museums. See some of the best examples at the British Library's site (www.bl.uk/collections/treasures/digitisation1.html), where 10 documents, including Leonardo da Vinci's "Notebooks," are reproduced. ▲



AllofMP3.com offers songs and videos for pennies a megabyte, but no one seems to know whether it is legal.



Music 6 file на 31.41 Mb

	Artist	Album	Type	Tracks
☐	Britney Spears	In The Zone '2003	online ENCODING	1
☐	Eminem	The Eminem Show '2002	online ENCODING	1

Details: Eminem "The Eminem Show"

	Song	Time	Format	Data of encoding	Size	Cost	File
☐	Without Me	4:50	mp3, lame, 192	29.12.2003 15:40	6.65 Mb	$0.066	

	Artist	Album	Type	Tracks
☐	Korn	Take a Look in the Mirror '2003	online ENCODING	3
☐	Madonna	Remixed And Revisited '2003	online ENCODING	1

Tunes By The Megabyte

The Russians may have trumped even Steve Jobs and his wildly successful iTunes music site. 99 cents a song? Nyet! How about a penny a megabyte? You choose the compression format (MP3, WMA, Ogg Vorbis, etc.) and the bit rate to determine for yourself the balance of audio quality and download size you prefer. In many cases, a CD-quality song will cost you far less than one of the major music download services here in the States. And, yes, AllofMP3.com does take U.S. currency. Exactly how legal all of this remains an open question, however. Using some seriously challenged English grammar, the site claims to operate within Russian law and pay licensing fees to the appropriate organization. But according to most reports, no one in the Western recording industry seems to have heard of this organization and whether it passes these fees on to the publishers and artists who are entitled to them. ▲

Google-topia:

Hold Hands, Hug A Tree & Make Billions

When Google announced in April that the company was going public and would issue $2.7 billion in stock, the financial and Web analysts spent most of their time speculating about how high its stock would climb in one of the most hotly anticipated IPOs in years. The press coverage all duly noted that company founders Sergey Brin and Larry Page would be selling the initial stock via a unique online auction that would make the shares more widely available to the general public. Nevertheless, many in the press failed to read the fine print of the formal S1 filing with the SEC, an unprecedented corporate mission statement with subsections entitled "Do No Evil" and "Making The World A Better Place." "We aspire to make Google an institution that makes the world a better place," the company declared. To that end, the philanthropic Google Foundation will receive 1% of company equity and profits. "We hope someday this institution may eclipse Google itself in terms of overall world impact by ambitiously applying innovation and significant resources to the largest of the world's problem." This is not your father's IPO. ▲

My wife Nancy and I have crafted a perfect delayed-incentive gift for both our grandsons.
Table Mountain, Washington

DriveYourGrandkidsCrazy.com

We're sure that retired independent video producers Alan and Nancy Bixby had all the best intentions when they decided to bury family mementos and small heirlooms in time capsules at wilderness "drop sites" around the country. We're just glad that we're not part of this clan. The idea was to encourage the next generations of family to reconnect with their own roots and with nature at the same time by hunting down these capsules that were deliberately planted way off the beaten trail. The GPS coordinates of each hidden capsule are recorded so that the grandkids aren't flying blind through the wilds of Colorado or Idaho. Gee, thanks, Grandpa. The Bixbys use their site (www.timeinacapsule.com) to record these exploits and offer detailed instructions for doing this with your own family. This may be another good reason to keep Grandma off the Internet. ▲

New On The 'Net

Cybercafe Crackdown

Fearing that its youth is being corrupted by their insatiable thirst for the free flow of information on the Internet, Chinese officials closed down 8,600 cybercafes across the nation in recent months. The Chinese government strictly regulates cybercafe operation, including a law preventing a cafe from being opened within 200 meters of a school. Officials claim that "unhealthy online information" impacts teenagers' mental health and causes a dangerous addiction. After a two-day marathon at a local cybercafe, two teens fell asleep on nearby railroad tracks and were killed by a train, which China seems to think is proof enough of the dangers of the Web. ▲

Take A Picture & Pass It Along

What happens when you hand a stranger a camera with instructions to take a few pictures and then pass it along? The Random Pixel project did just that, releasing six cameras into the wild in 1998 and another 10 in 2000. Stickers on these cameras asked the person who finished the roll to return it. Now, the results of this wacky experiment are online at randompixel.com, and they are remarkably mundane considering the project's flighty ambitions. Every Tuesday, the site founder will post images from a newly returned camera. Of the first set of six in 1998, however, only two were returned. ▲

The Living Room Candidate

THE
LIVING
ROOM
CANDIDATE
A HISTORY OF PRESIDENTIAL CAMPAIGN
COMMERCIALS, 1952-2000

Presented by the American Museum of the
Moving Image in cooperation with the Political
Communication Center, University of Oklahoma.

If you think political campaign advertising only took a turn for the worse in recent years, you should look at the comprehensive online retrospective from the American Museum of the Moving Image, The Living Room Candidate (www.ammi.org/livingroomcandidate). The site pulls together some of the cheesiest, silliest, and most famously effective campaign promotions from all of the presidential elections of the TV era. The current online collection only goes up to the 2000 campaign, but it should be updated with samples from this campaign sometime in June. ▲

BIOS Upgrades Available Online

Compiled by Kevin Savetz

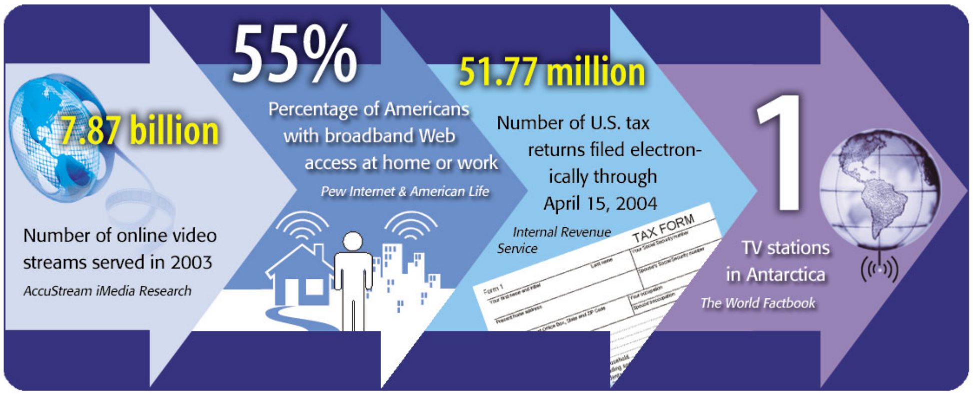
Before you send another motherboard to the landfill, consider upgrading the BIOS and giving your PC a new outlook on life. Here are a few recently released upgrades. Readers can check out www.cpumag.com/cpujul04/bios to see our entire upgrade list.

Motherboard	Date Available	URL
AOpen MX4SG-4DN	05/05/2004	download.aopen.com.tw/downloads/userdownload_List.asp?RecNo=8031&Model=MX4SG-4DN
AOpen AK77-600 Max	05/05/2004	download.aopen.com.tw/downloads/userdownload_List.asp?Publish=Yes&RecNo=8027&Model=AK77-600%20Max
Biostar M7VIT BRAVO	04/19/2004	www.biostar-usa.com/mbdownloads.asp?model=m7vit+bravo
Intel D845EPI	04/292004	www.intel.com/design/motherbd/pi/pi_bios.htm
Intel D845GVSR	0429/2004	www.intel.com/design/motherbd/sr/sr_bios.htm
Intel D845GLVA	04/29/2004	www.intel.com/design/motherbd/va/va_bios.htm

Compiled by Steve Smith

We can't find weapons of mass destruction in Iraq, but the threat of these devices landing in the hands of terrorists is real enough to merit its own governmental group, the DTRA (Defense Threat Reduction Agency). Northrop Grumman needs a program planner who will join work on contracts for this group, but you will need to navigate the DoD's (that's Department of Defense) acronym jungle. The DTRA defends the United States against CBRN (chemical, biological, radioactive, or nuclear) attack agents and needs you to support the "PPBS (planning, programming, and budgeting system) process with specific emphasis on Program Objective Memorandum definition and integration." We admit, we don't know what that means, but its sounds awfully important and requires background in modeling and simulation, handling DoD classified data, and a security clearance, which means that you should already know all of these and thousands more Pentagon acronyms. ▲

RAW DATA



7.87 billion
Number of online video streams served in 2003
AccuStream iMedia Research

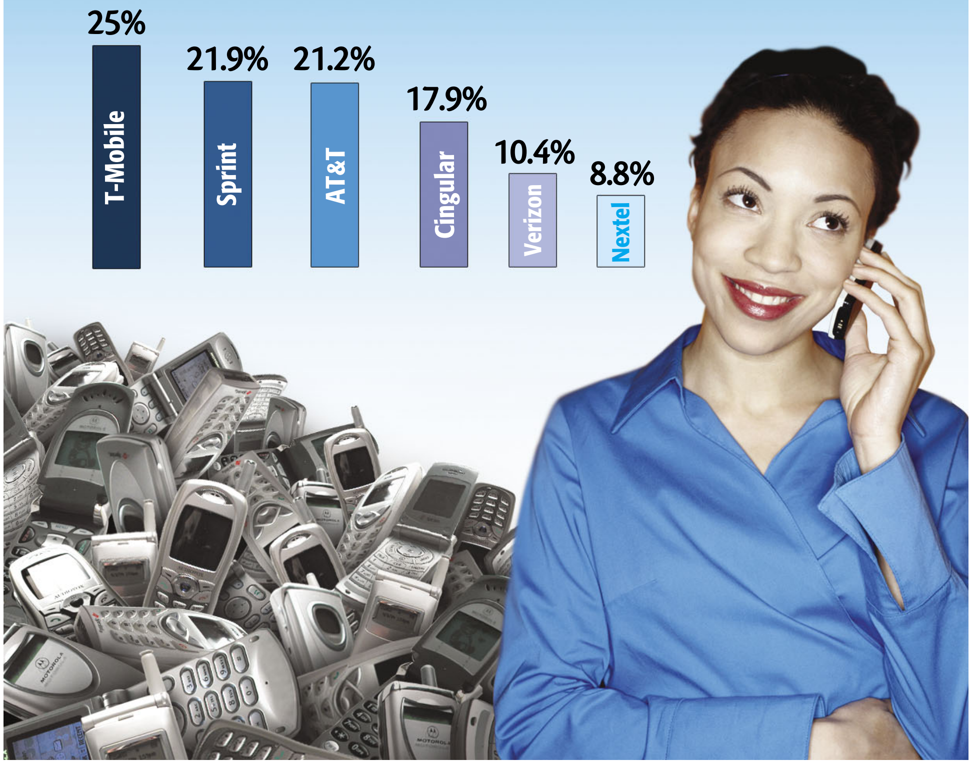
55%
Percentage of Americans with broadband Web access at home or work
Pew Internet & American Life

51.77 million
Number of U.S. tax returns filed electronically through April 15, 2004
Internal Revenue Service

1
TV stations in Antarctica
The World Factbook

As The Mobile Users Churn

Mobile phone users are getting more fed up with their carriers. This year the wireless industry may face very high churn rates as many of us look to make a switch. U.S. wireless customers who say they "definitely will" or "probably will" switch providers in the next year increased from 14.5% of customers in 2003 to 17.9% in 2004, "reflecting a fiercely competitive market, as well as a greater degree of freedom that consumers have to switch carriers now that they can take wireless numbers with them," says Clint Wheelock, director of wireless research, In-Stat/MDR. The chart below indicates the share of customers for each major mobile provider who say they are likely to switch to another company this year.



Source: In-Stat/MDR

More than a monitor,
it's a window to your memories.
BenQ

View digital photos instantly — no PC required. The BenQ FP591 and FP791, featuring Digital Photo Frame (DPF), allow you to view digital photos instantly just by inserting your camera's memory card. No cables, downloads or hassles. Just pure enjoyment. And the image quality is every bit as spectacular. A+ panel quality (ranking at the top of the industry's stringent standards), lightning fast 16ms response time, ultra-high brightness/contrast ratio, and SRS® stereo surround sound combine for a display you'll cherish as much as your fondest memories.

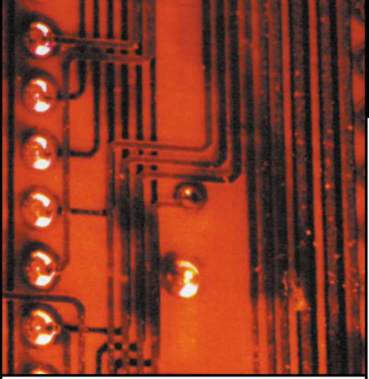
For more information, visit www.BenQ.com/2003/SmartComputing-FP791
To contact us, visit www.BenQ.com/ProdInfo or call (866)700-2367

©2003 BenQ America Corp. All rights reserved. PC Magazine "Best of Comdex" FINALIST Award Logo is a trademark of Ziff Davis Publishing Holdings Inc. Used under license. All trademarks and registered trademarks are the property of their respective holders.

A+ PANEL QUALITY

PC MAGAZINE 2002 BEST OF COMDEX FINALIST
Nov. 20, 2002 BenQ FP591
Hardware, Peripherals

BenQ
Enjoyment Matters



Alex St. John was one of the founding creators of Microsoft's DirectX technology. He is the subject of the book "Renegades Of The Empire" about the creation of DirectX and Chromeffects, an early effort by Microsoft to create a multimedia browser. Today Alex is president and CEO of WildTangent Inc., a technology company devoted to delivering CD-ROM quality entertainment content over the Web.

The Saint

by Alex St. John

Spyware 3.0

(The Last Word On "Removeware")

After enormous damage to my business' reputation, we've finally succeeded in persuading the leading removeware vendors that our software isn't "spyware" or "adware." In the course of this experience, I've learned many troubling things: Somebody needs to educate the hysterical about the truth to counter the irrational fear of all software that is distributed electronically. I hope this series of columns has been a good first step in that direction. I will close this series with some facts for you intelligent folks to ponder.

Windows was not designed with software uninstallation in mind. Microsoft never expected users to really remove Office from their machines once it was installed. Uninstallation is an afterthought, and as such, is very difficult to do correctly and thoroughly in Windows. This is especially the case for software plug-ins that run in the browser.

All software that does not fully and cleanly remove itself when asked to uninstall is not necessarily sloppy or malign; there are many good reasons for software to leave bits behind. The number of Registry entries and files that a software product has is not a measure of how bloated, sloppy or resource-consuming it is. The Windows Registry was designed as a place for software to store persistent state information independently of the file system or file system path names. This was done, in part, to make it easier for consumers to drag and drop files around on their Desktop without breaking important data associations contained within those files. An application with a lot of Registry entries may just be doing a great job of using the Registry exactly as intended.

> **Windows was not designed with software uninstallation in mind.**

Well-designed applications commonly share components with other applications to minimize bloat. This sharing is a problem when it comes to uninstallation because nothing in Windows forces all applications that depend on shared components to record this sharing correctly with the Registry. As such it is dangerous for an application asked to uninstall itself to delete shared components, even when the Registry says deletion should be safe; the Registry can't be trusted.

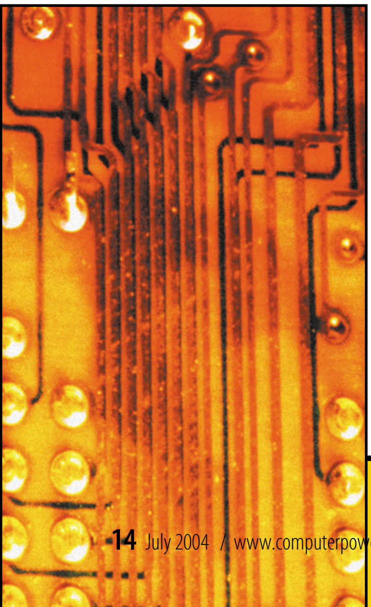
If a Windows app can't really know how to uninstall itself cleanly, how can a third-party removeware product with no understanding of how that application was designed to work be more effective at removing it from your computer? It can't be. In our case the leading removeware vendors were "uninstalling" our software by unilaterally deleting all directories on the user's system named WILD TANGENT. If you had a folder by that name containing personal documents or important files, your removeware would have deleted them.

There are two broad classes of online software that are completely legitimate that bear many of the hallmarks typically associated with spyware. The first is DRM (Digital Rights Management) technology used to sell and secure electronic assets, such as music, video, and games. In order to sell a user a digital asset, most DRM technologies must gather information about the user and their machine and bind that data securely to the purchased asset which inherently associates that data with personally identifiable information. That software may also have to bind that asset to a particular machine and encode data on that machine that is difficult to remove to prevent tampering or hacking to steal the asset.

The second broad class of software includes updaters (or download managers) that are designed to enable complex software products to be easily supported on a large scale through automated error reporting and patching systems. Windows Update is the most obvious example of this kind of application. Updaters and download managers will increasingly and necessarily become components of all software we buy. They can be used for both good and evil, but it is a serious mistake to label them all "spyware" and for removeware products to tamper with them.

An important change has occurred in the software world. The Internet has made software a "broadcast media." Applications are no longer static media like movies that once created, never change; they have become sitcoms that evolve constantly, are often sponsored by advertisers, and are broadcast into your home like television instead of having to be sought out. It's progress and a natural feature of the Internet. Think about it. ■

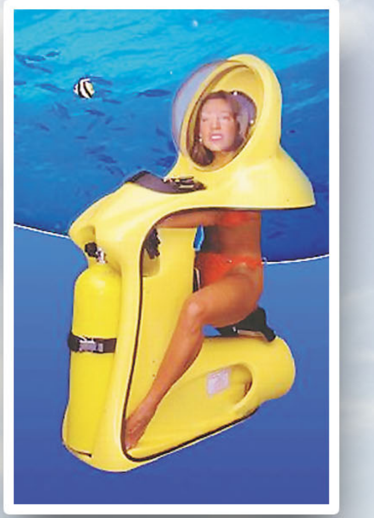
Getting riled up? Email TheSaint@cpumag.com.



Dream Hardware

It's a fine, fine day for a reunion with NEC's Resonantware. Three new lowercased concept devices grace the line we last visited in the October 2003 issue (page 16). Speaking of concepts, you can make yours a reality with the InVision HR 3D printer and a handful of Amethyst SL stereolithography material. And when you tire of making little blue thingamabobs, you can go explore the Big Blue on your Scuba-Doo. Don't forget your scuba snacks.

by Marty Sems

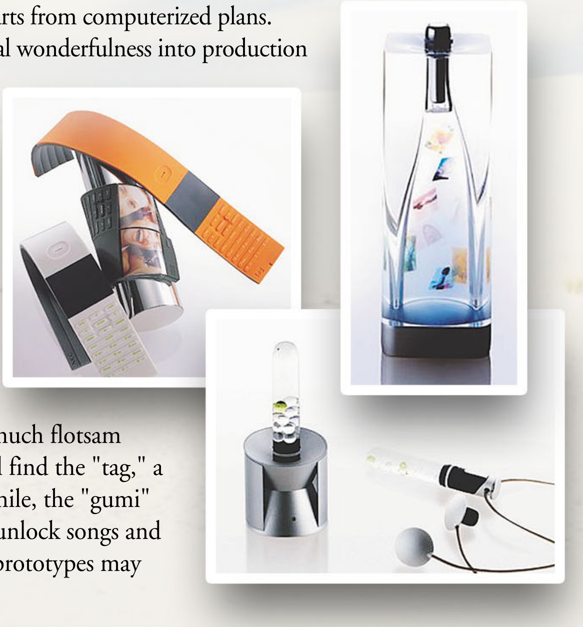


Scuba-Doo

Australia always gets cooler stuff than the States. Sharks that mean it. Aussie 351 Cleveland heads. Miranda Otto. So we're disappointed, not shocked, to find that the Scuba-Doo underwater moped (www.scubadooworld.com) is Oz-only at the moment. For the equivalent of $13,050 (U.S.), you too could scout out the Great Barrier Reef cleverly disguised as an enormous yellow seahorse. If you're up on your bathysphery, you know that the bubble of breathable air in the Scuba-Doo's helmet means you don't even have to get your hair wet. Air tank and battery life conspire for about an hour's exploration time. Something like this could really open up the pleasures of the underwater kingdom to more physically disabled people, but its cinematic possibilities seem limited. "Mad Max" on Scuba-Doos just wouldn't have been the same.

3D Systems InVision HR

We are ever so slightly closer to our goal of owning the make-me-a-Kelly-LeBrock computer peripheral celebrated in “Weird Science” thanks to this 3D printer from, er, 3D Systems (www.3dsystems.com; a regular InVision is shown)." With the InVision HR, you really could make your own fully-grown woman, as long as you don't mind that she's 2 inches tall, inanimate, and blue. But these are minor quibbles. Actually, this $59,900 gizmo is a stereolithography device used to make prototypes of jewelry and other small parts from computerized plans. Being philistines, we would misdirect its technical wonderfulness into production of a vast, adoring Smurf army.



NEC Resonantware

Part of the latest round of Resonantware (www.nec-design.co.jp/showcase/index.html) concept devices from the brainy brains at NEC, the "flacon" is sort of a bottle that serves up memories. (Funny, the rest of our bottles tend to work the other way.) This electroluminescent decanter displays your digital images as so much flotsam inside. It can even project photos outside itself through its stopper. Elsewhere, you'll find the "tag," a digital phone you can wrap around your wrist should the impulse take you. Meanwhile, the "gumi" concept sweetens the DRM pill, quite literally. Gumi are edible RFID candies that unlock songs and other digital content through a wireless cradle. Like last year's Resonantware, these prototypes may never see the light of day. At least we can dream of them.

Controllers On Parade

Your Computing Life Just Got Easier

Most of us live under the delusion that an optical mouse and a keyboard with media playback buttons on it are about as good as it gets in the world of input peripherals. To push the envelope, some of us even go cordless. But if you know where to look, there are some amazing gadgets out there.

We scoured the industry for the coolest input devices that most of us can afford. Our goal wasn't to see how far we could push them but to see how much they could improve what we already do. It's one thing to be awed by something you'll never use; it's far better to find hardware that makes you say, "Hey, with this I could. . . ." With these devices, you can.

ATI Remote Wonder II

The best thing about the Remote Wonder redux is the IR blaster that plugs into the RF receiver. The catch is that the IR blaster doesn't exist yet. There are only a couple of add-on feature jacks in the receiver's side looking innocuous and lonely. An IR blaster is the only way to access channels above 125 through your set-top box when using a TV tuner card (All-In-Wonder cards included), so this will be a really cool feature—someday.

The RWII is still a terrific PC remote. With RF reception up to 60 feet from the base receiver (which now sports a stubby 1-inch antenna), the unit is suited to presentation halls, living rooms, and offices. Physically, the unit is slimmer, better contoured, and more comfortable than its predecessor, especially thanks to the switch from an omni-directional pad to a rubberized dome with a dent in the center for your thumb.

The RWII is as customizable as the original RW, complete with programmable launch buttons, native support for numerous multimedia apps, and a free SDK so you can write support for your own esoteric favorites. The RWII's added comfort translates into slightly better pointer control when using the remote in place of a mouse, but it still takes a lot of practice to get good at landing on small on-screen targets. The hardware and drivers installed fine on our second system, but the post-install reboot on our first box yielded a nasty "NTLDR is Missing" boot problem that took considerable time to sort out. Still, this remote remains one of the best PC-centric models on the market.

Belkin Nostromo Speedpad n52

The n52 is an assault of controls: 14 programmable keyboard buttons, two programmable thumb buttons, a scroll wheel, and an eight-way pad. Amazingly, most of these are fairly easy to reach without lifting your palm from the adjustable/removable rest.

Software is the n52's heart. The Profile Editor provides a wireframe view of the device on-screen with listings for each button's assigned function. To map a new function to any button, click it and select from the menu. With shift states (akin to pressing CTRL, ALT, or Function keys), you have 100 different functions available to your five left fingers.

Belkin's Loadout Manager lets you create a mapping profile that loads whenever you execute a given program. Also, when you're done gaming and ready to get back to work, a macro recorder/editor is excellent for assigning lengthy tasks in any application.

For kicks we decided to remap all of the controls for Quake III Arena to see if we could play it effectively with only the left hand. Gaming required the dexterity of a guitar solo, but after a half hour, we were getting close to mouse-keyboard accuracy, and that was while drinking a pop with the other hand. All told, it's hard to find fault with this little wonder.

Remote Wonder II
$50
ATI
www.ati.com
CPU CPU CPU

Contour ShuttlePRO V.2

Sleek, comfortable, and sublimely flexible, the ShuttlePRO is a shortcut lover's dream. With an inner jog wheel surrounded by a spring-loaded shuttle ring surrounded by 15 buttons, you can map just about any function. The bundled software makes quick work of applying keystroke combinations to any of the 15 buttons.

If you're an ordinary consumer into everyday Internet apps and playing games, you don't need the ShuttlePRO. The name of the game is combining these shortcuts with apps that really take advantage of the jog wheel and scroll ring, and that means content creation and editing apps.

Contour includes profiles for many multimedia titles, including such titles as Adobe Audition, 3ds max, and Pinnacle Studio. With the prosumer and pro applications, you need extreme levels of precision, but often the more precise you get the more cumbersome a mouse and keyboard proves to be. This is where the ShuttlePRO earns its keep, and serious users will learn how to customize the device for their individual styles and projects.

Upshot: If you're an A/V geek, buy the ShuttlePRO V.2. If not but you still want easy button shortcuts, the Nostromo isn't a bad way to go.

Fellowes Secure Touch Mouse

The Secure Touch is a consumer-level fingerprint scanner. You get the scanner wrapped up in a basic optical mouse, thus ridding your desk of one extra gizmo. Slick!

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Nostromo SpeedPad n52
$50
Belkin
www.belkin.com

Secure Touch Mouse
$80
Fellowes
www.fellowes.com

ShuttlePRO V.2
$130
Countour Design
www.contourdesign.com

iGesture Pad
$159
FingerWorks
www.fingerworks.com

The bundled OmniPass software makes quick work of registering any or all of your 10 fingerprints. These are tied to your Windows login password, and each system user can get biometrically registered. With this done, you can then link your fingerprint to other passwords, such as for Web sites.

Mouse fingerprint scanning proved 100% accurate for us across several users, and the software is easy to use. However, the mouse is too small for large hands, feels cheap, and lacks the precision we are accustomed to from Logitech and Microsoft optical models. Also, after sitting idle for long periods, the system had to redetect the mouse when we moved it. In short, we love the security functions but wish Fellowes would invest a bit more in the physical design.

FingerWorks iGesture Pad

The iGesture Pad is a USB-powered touch pad with a 6.25-inch x 5-inch active area. Unlike standard touch pads, iGesture products can sense multiple touch points at once. This lets you chord commands with multiple fingertip positions and drag directions. For example, an outstretched thumb and first three fingers pulled together execute a Save function. There are about 24 basic, universal gestures for the most common operations. Once you put in the time, gestures really do save time, and the accuracy is top-notch.

In addition, if you drag your palm up on the pad, this activates Game Mode. You have 11 new functions available, such as wheel up, pointing, and the right-mouse button. This allows for simultaneous control of firing buttons and pointer control with one hand. After spending time with the Pad, we suspect a proficient user could achieve the same level of skill as a mouse gamer, but we don't yet see any specific advantage to the pad.

The iGesture takes a lot of practice. Our first try with the Exit gesture (thumb and last three fingers spread out, hand rotating clockwise) resulted in IE's Address drop-down menu appearing. Our thumb wasn't far enough away from the other fingertips.

The iGesture Pad really shines in apps such as Photoshop or Maya wherein you can custom-program gesture macros to take over lengthy, repetitive operations. The animated tutorials and documentation are decent, and the overall value is good for those who spend a lot of time using a mouse.

Gyration Ultra GT Cordless Optical Mouse

Thanks to a built-in dual-direction gyroscopic sensor, the Ultra GT can accurately sense motion from left to right and up and down. When you move your hand, the on-screen mouse pointer moves with it. Sounds simple, but the result is so intuitive, precise, and comfortable that you can only be amazed.

The Ultra GT smartly positions a trigger under your index finger so you can move the pointer while the trigger is depressed, but the pointer locks in place when you let go. The scroll wheel and left and right buttons are comfortably positioned under your thumb.

On your desk, the Ultra GT works as a high-resolution wireless (49MHz) optical mouse, and without the nasty lag time. The Ultra GT is comfortable in either the desktop or handheld orientation, and Gyration also includes software that lets you build application-centric profiles of hand gestures.

The USB receiver provides connectivity up to about 30 feet away, the software installed without incident, and it took about 20 seconds to become fluent in pointer control. We only wish the recharging cradle had been built into the RF receiver. Otherwise, this mouse is darn near perfect, especially given its reasonable price.

Ideazon Zboard Starter Kit

The Zboard is simply a platform with a bunch of spring-loaded rubber nubbies across it. But you then take a three-section keyset sporting key layouts optimized for different applications, unfold it, lay it into the Zboard, and snap it down. Voila! You now have a keyboard brimming with common shortcuts and key layouts ideal for your software. Changing out keysets took only 10 seconds.

The Zboard Starter Kit comes with a standard QWERTY keyset optimized for IE6. There's also a gaming keyset descended from Ideazon's Crossfire keyset. This is sort of a generic gaming layout ideal for FPS titles featuring a butterfly-button arrangement under the left hand surrounded by different functions, such as Reload, Jump, and Console. We question button placement at a couple of points, such as putting the Crouch button down and left of where your pinky hits. Also, we noticed several times that some keys wouldn't depress until we unsnapped the keyset and laid it carefully back in place.

But our gripes are few, and the layout is generally excellent; it will make a newbie

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Zboard Starter Kit

$50
Ideazon
www.ideazon.com
CPU CPU CPU C

Ultra GT Cordless Optical Mouse

$80
Gyration
www.gyration.com
CPU CPU CPU CPU C

X-Arcade Two Player

$150
XGaming
www.x-arcade.com
CPU CPU CPU CPU

proficient and an expert unstoppable. Just know that the suitability for prolonged typing is marginal. Most less-expensive keyboards will prove more comfortable.

XGaming X-Arcade Two Player

The X-Arcade Two Player feels just like an old coin-op console because it's made from the same materials and built to withstand the pounding of hundreds of pubescent pugilists. To the right of the stick are the standard six command buttons (unlabeled) with an extra two buttons below them. Both players have identical controls, plus there's a white button on the left and right for pinball flipping and console configuration.

XGaming sent us PC and Xbox connectors. (PlayStation 1 and 2, DreamCast, Mac, and GameCube adapters are also available.) On the console, we found such games as Dead Or Alive 3 and Fusion Frenzy were perfect for this format. We were doubly glad that we received the two-player version because half the fun of coin-op consoles was the nearly toe-to-toe physical proximity between contestants. On the PC, we were in nostalgic nirvana while playing MAME titles such as Galaga and Pac-Man.

Beyond classic arcade and fighting games, however, we found X-Arcade's suitability diminishing because of the limited controls. More problematic was the device's physical nature. The platform stands about 4 inches high and tilts slightly toward the user. This is fine for PC use on a desktop but is uncomfortable on the floor or a couch with a console. Even at a desk, two people might be comfortable sitting on stools or folding chairs.

If you can overcome the ergonomics, the X-Arcade Two Player is every old-school gamer's dream. ▲

by William Van Winkle

For more input device reviews and our "Top Tweaks & Tips" sidebar, subscribers can go to www.cpumag.com/cpujul07/input.

Intense Input Devices

Looking for an input device that does more than input? Well, we've got a little something for everyone. Here's the lowdown on the off-the-beaten-path peripherals we tested.

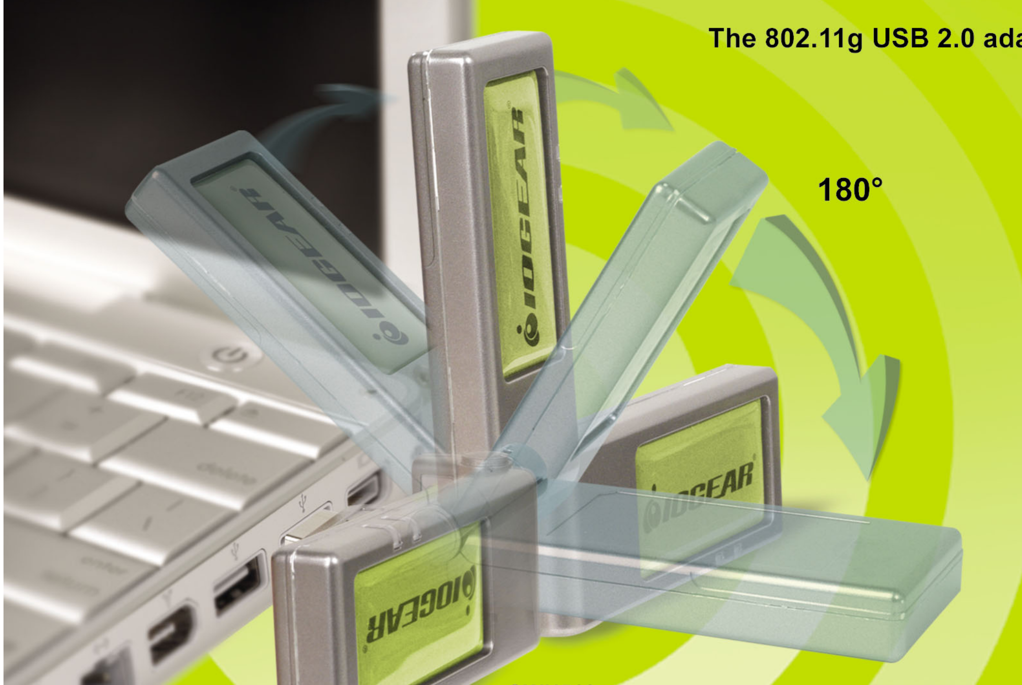
	Price	Pros	Cons
ATI Remote Wonder II	$50	RF; future IR blaster upgrade; programmable launch buttons	Possible driver instability; mouse control still awkward
Belkin Nostromo Speedpad n52	$50	Comfortable; excellent software; save/transfer profiles	Some buttons tricky to reach; need wireless version
Contour ShuttlePRO V.2	$130	Map keystrokes to buttons; ultra-precise control	Bit pricey; less suitable for non-A/V software
*Designer Appliances Quill Mouse	$100	Removes most carpal tunnel pressure in wrist; effective software	Need bigger model for bigger hands; Nib software is overpriced
Fellowes Secure Touch Mouse	$80	Good price; easy fingerprint registration process; accurate recognition	Mouse feels cheap and flimsy; too small for large hands
FingerWorks iGesture Pad	$159	Reduces mouse/keyboard commands; gaming mode	Expensive; heavy learning curve to memorize gestures
Gyration Ultra GT Cordless Optical Mouse	$80	Remarkably intuitive and accurate; doubles as optical desktop mouse	Needs charger built into receiver module
Ideazon Zboard Starter Kit	$50	Smart and plentiful shortcuts/key commands; gaming keyset	Better positioning for some gaming buttons; prolonged typing uncomfortable
*Logitech Cordless Presenter	$200	Excellent mouse accuracy; Bluetooth dongle	Needs rechargeable batteries; awkward mode switching
*Microsoft Wireless IntelliMouse Explorer	$65	Ultra-comfortable design; great tilt wheel design	Needs more leather; side-to-side movement stutters on-screen
XGaming X-Arcade Two Player	$150	Great for classic/fighter games; compatible with PC/Mac/most consoles	Uncomfortable to use anywhere except at a desk; feels just like a coin-op console

*SEE WWW.CPUMAG.COM/CPUJUL07/INPUT FOR REVIEW.

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Immaculate Wi-Fi Reception

The 802.11g USB 2.0 adapter with twist-and-shout flexibility!



IOGEAR's ultra fast Wireless-G 802.11g USB 2.0 adapter can help you connect to a wireless network with "higher power." It bends and twists to ensure optimal reception so you can work at up to 54Mbps at home or anywhere a hotspot is available.

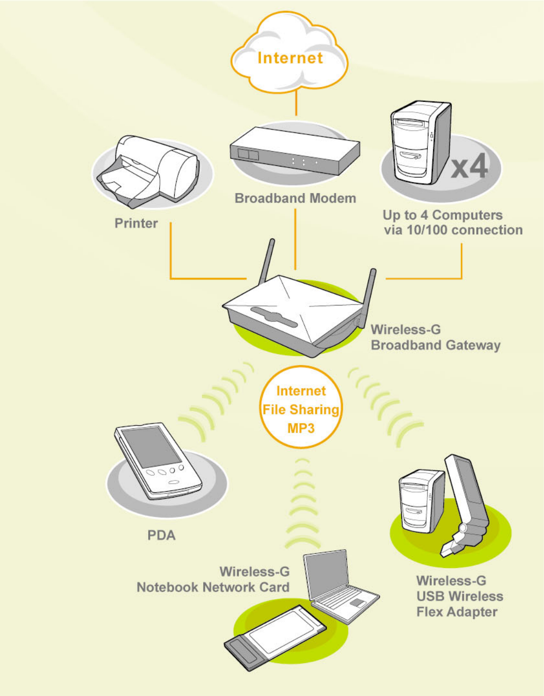
Installation takes just moments. All IOGEAR Wireless-G products offer the latest security and are backward compatible with 802.11b.

So "retire the wire" without sacrificing Internet speeds - pick up IOGEAR's line of Wireless-G products today!

GWU513

Wireless-G to USB 2.0 Flex Adapter

- Uses USB port, not cardbus or PCI slot
- No configuration hassles
- Flexes and pivots for optimal reception


Internet
Printer
Broadband Modem
x4
Up to 4 Computers via 10/100 connection
Wireless-G Broadband Gateway
Internet File Sharing MP3
PDA
Wireless-G Notebook Network Card
Wireless-G USB Wireless Flex Adapter

GWA501

Wireless-G Broadband Gateway/Print Server

- Fast setup in just a few simple steps
- Includes everything for effortless installation
- Built-in firewall, supports WPA and WEP
- Built-in print server shares your printer with all connected computers

GWP511

Wireless-G Notebook Network Card

- Low-profile high-gain antenna achieves favorable sleek design
- Included Software Access Point allows you to turn your notebook into a wireless Access Point

IOGEAR Inc.
23 Hubble Irvine, CA 92618 P: 949.453.8782 ext. 2011 http://smc.iogear.com

Tech Data

IOGEAR®
New Thinking, New Style

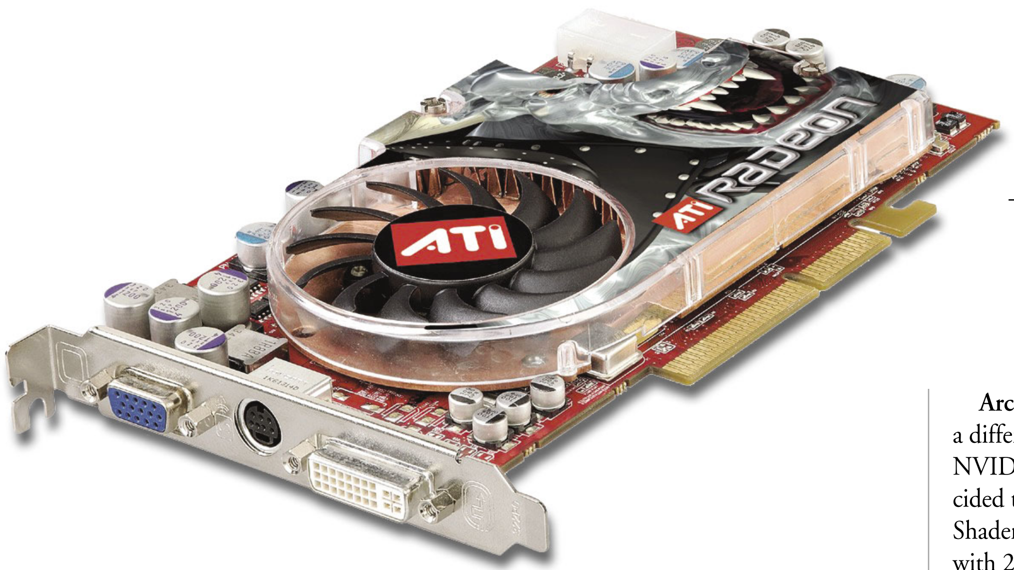
© 2004 IOGEAR, Inc. All rights reserved. All other trademarks are the property of their respective owners.

ATI's Next Wave

Radeon X800 XT Platinum Edition & X800 Pro

Radeon X800 XT Platinum Edition
$499
ATI
(905) 882-2600
www.ati.com
CPU CPU CPU CPU CPU

Radeon X800 Pro
$399
ATI
(905) 882-2600
www.ati.com
CPU CPU CPU CPU



Last month we toyed with NVIDIA's NV40 chip in big-daddy "Geforce 6800 Ultra" form, with its massive transistor count and Shader Model 3.0 features. Based on what we saw, it was going to take something rather special for ATI to equal, never mind top, NVIDIA's efforts. The new R420 architecture's paper specs look just as exciting but perhaps not quite as forward thinking. Clearly the race is on, as we were surprised at just how potent the review units we received from ATI were when it came to the benchmarks.

First off is the high-end Radeon X800 XT Platinum Edition, which sports 160 million transistors—some 50 million more than the previous-generation R360 chip. Based on a low-k dielectric 0.13-micron TSMC FAB process, the 500MHz core clock speed is more aggressive than the 6800 Ultra's. The GDDR3 memory, which still uses a 256-bit interface, clocks in at 525MHz x 2 (effectively 1.12GHz), which is in line with NVIDIA's top draw effort. The X800 XT's peak fill and texture rates of 8.3 gigapixels per second actually raise the bar even higher than the 6800 Ultra's 6.4 gigapixels per second, which was the previous best. With 16 pixel pipelines and six vertex pipelines at its disposal, the tale of the tape is markedly similar to NVIDIA's. The stonking 36.8GBps memory bandwidth is also just ahead of NVIDIA's and pales in comparison to the previous generation R360's 23.4GBps.

Architecture. Architecturally there is a difference in the choices the ATI and NVIDIA engineers made. NVIDIA decided to push the boat out and support Shader Model 3.0, whereas ATI stuck with 2.0; this is probably reflected in the smaller number of transistors on the R420. With its 16 x 1 pixel pipeline, it can render up to 16 single-texture pixels in parallel per clock cycle. Just like NV40, R420 actually serves up its pipes in groups of four, with the X800 XT dishing out four of these quads. Putting this in perspective, ATI has exactly doubled the R360's 8 x 1 pipeline, which was grouped into two quad pipes. Each pixel shader

3DMark03	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	11527	9423	6487	6692	12001
1,600x1,200	7444	5745	3751	3854	7774
1,024x768 4XAA/8XAF	6738	5325	3060	3025	6672
1,280x1,024 4XAA/8XAF	5057	3906	2251	2201	5012
1,600x1,200 4XAA/8XAF	3988	3014	1670	1669	3900

Call Of Duty	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	142.6	140.4	141.9	163.2	164.5
1,600x1,200	130.4	129.9	127.2	145.7	157.5
1,024x768 4XAA/8XAF	140.8	140.1	140.1	147.5	165.3
1,280x1,024 4XAA/8XAF	138.6	136.9	116.6	117.5	162.8
1,600x1,200 4XAA/8XAF	127.7	117.3	88.5	91.7	151.3

Comanche 4	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	65.8	65.16	66.6	72.2	71.1
1,600x1,200	64.8	64.9	64.2	65.9	70.1
1,024x768 4XAA/8XAF	64.5	64.2	55.8	65.3	69.9
1,280x1,024 4XAA/8XAF	63.7	61.2	44.2	54.4	67.0
1,600x1,200 4XAA/8XAF	59.8	53.3	33.8	43.2	59.6

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Dungeon Siege	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	114.6	114.7	114.6	119.9	120.3
1,600x1,200	114.6	114.7	113.4	116.6	120.0
1,024x768 4XAA/8XAF	114.7	113.8	112.0	114.9	118.5
1,280x1,024 4XAA/8XAF	113.5	112.1	106.6	107.7	116.9
1,600x1,200 4XAA/8XAF	112.9	107.4	93.7	94.3	113.7

Halo: Combat Evolved (Pixel Shader 2.0)	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	84.1	75.6	60.5	55.7	92.5
1,600x1,200	62	47.6	28.9	27.7	61.6

Flight Simulator 2004	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	52.9	52.9	55.1	58.4	58.0
1,600x1,200	51.8	51.7	53.4	57.3	56.0
1,024x768 4XAA/8XAF	53.9	53.8	50.0	50.6	57.3
1,280x1,024 4XAA/8XAF	52.9	52.5	39.6	39.0	56.6
1,600x1,200 4XAA/8XAF	51.4	51.9	31.8	30.8	54.1

Return To Castle Wolfenstein: Enemy Territory	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	99.7	99.2	99.1	111.5	109.4
1,600x1,200	98.4	98.5	90.9	91.4	109.0
1,024x768 4XAA/8XAF	97.7	94.3	78.6	79.8	108.8
1,280x1,024 4XAA/8XAF	90.5	77.5	56.3	61.9	100.8
1,600x1,200 4XAA/8XAF	75.8	FAIL	40.3	38.2	70.9

Serious Sam: The Second Encounter	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	12.5	109.6	101.7	121.6	126.1
1,600x1,200	89.6	77.9	65.2	83.5	119.4
1,024x768 4XAA/8XAF	94.9	80.2	71.3	82.4	117.4
1,280x1,024 4XAA/8XAF	73.8	59.6	51.2	59.0	97.8
1,600x1,200 4XAA/8XAF	59.2	44.6	38.3	43.4	75.9

Splinter Cell	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	78.7	73.4	57.7	41.7	80.6
1,600x1,200	73.9	62.8	41.5	32.1	71.8

unit can perform up to five (a collection of two three-component vector operations, two scalar ops, and one texture address op that can all work in parallel) floating-point instructions per clock and sports two vector ALUs and a couple of scalar ALUs.

When all 16 pipes are pegged, the theoretical specs look tasty: 80 floating-point operations per clock are possible from the pixel shading units. ATI didn't just double R3xx's architecture, but the company dug in deep to refine the number of temporary registers from 12 to 32 and added a facing register, which allows for better efficiency in determining a polygon's front or rear. This comes in handy for double-sided lighting scenes. The shader instructions limit has been raised all the way up to 1,536 (512 scalar, 512 vector, and 512 texture operations) per pass. Even though R3xx was able to do "only" 160, games such as Half-Life 2 max out with no more than 30 pixel shader instructions per scene. The F-buffer, carried over from R3xx, has been beefed up with a "temporary" staging area where a PSU is able to store/stage a pixel's value that will be revisited during the heavier multipass rendering instances.

Performance. NVIDIA has doubled its vertex shading performance with NV40, and in similar fashion so has ATI, as 3DMark's vertex shader tests show. On the vertex side of the fence, each of R420's six vertex-processing engines has a 128-bit vector ALU, as well as a 32-bit scalar ALU. Each vertex unit can do a single vector and scalar operation with a total of up to 12 instructions per clock possible when fully under the gun. NV40's vertex shader units are more advanced, however, with full dynamic branching capabilities, whereas the R420 can only do static branching.

The physical boards themselves look markedly similar to previous reference R360 design. Both the X800 XT and the X800 Pro are physically smaller than NVIDIA's NV40: They only require a single molex connector for auxiliary power and they occupy a single slot, making them perfect for the SFF crowd.

The benchmarks suite further clouded the differences between the two boards. Neither the X800 XT nor the 6800 Ultra proved to be considerably better than the other. In Far Cry, perhaps everyone's current flavor of the month, ATI does enjoy a considerable lead (for now anyway). But having played through a number of levels with each card, there was a very negligible performance difference. As far as image quality goes, the fact that NVIDIA applies its "bilinear filtering" optimization actually turned out to be beneficial with

Tomb Raider: Angel Of Darkness	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	128.9	123.8	96.2	59.0	119.4
1,600x1,200	128.9	123.9	96.2	25.8	119.9
1,024x768 4XAA/8XAF	120.7	100.6	70.3	45.2	103.5
1,280x1,024 4XAA/8XAF	85.5	66.19	44.6	27.7	71.3
1,600x1,200 4XAA/8XAF	67.6	FAILED	22.6	19.8	59.2

Unreal Tournament 2003	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	215.1	178.9	203.9	206.8	210.9
1,600x1,200	214.2	145.7	102.7	113.6	188.9
1,024x768 4XAA/8XAF	195.7	173.5	127.0	121.2	181.7
1,280x1,024 4XAA/8XAF	151.8	137.9	84.5	82.0	134.0
1,600x1,200 4XAA/8XAF	112.8	109.8	58.5	58.6	100.0

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Unreal Tournament 2004	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	147.8	148.7	143.6	143.4	152.1
1,600x1,200	146.9	147.6	122.0	122.5	151
1,024x768 4XAA/8XAF	146.2	146.8	126.2	134.6	150.7
1,280x1,024 4XAA/8XAF	142.7	137.8	91.5	72.7	144.6
1,600x1,200 4XAA/8XAF	131.5	109.4	67.8	67.8	125.6
X2: The Threat	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	95.9	84.4	67.6	71.7	95.6
1,600x1,200	67.2	58.4	41.5	48.0	66.4
1,024x768 4XAA/8XAF	72.9	63.7	43.9	49.8	77.6
1,280x1,024 4XAA/8XAF	57.7	49.5	32.0	35.5	60.4
1,600x1,200 4XAA/8XAF	47.9	39.8	24.7	27.4	49.0
Theoretical Tests: 3DMark03 1,600x1,200x32 4XAA 8XAF	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
Pixel Shader 2.0 Test	61.3	28.7	23.3fps	26.6fps	62.2fps
Vertex Shader Test	34.9	31.4	17.7fps	13.7fps	24.7fps
Fill Rate, Single Texturing (Mtexels/second)	2233.7	2136	1618.5	1577.3	2848.5
Fill Rate, Multi Texturing (Mtexels/second)	7322.9	5009	3176	2932.1	6177.2
Far Cry: Research Level (indoor/outdoor)	X800 XT	X800 Pro	Radeon 9800 XT	GeForce FX 5950	GeForce 6800
1,024x768	119.8	94.3	68.2	55.5	92.4
1,600x1,200	95	78	38.9	29.0	84.2
1,024x768 4XAA/8XAF	107.5	82.6	46.4	33.6	82.3
1,280x1,024 4XAA/8XAF	72.4	53.2	30.2	23.9	66.7
1,600x1,200 4XAA/8XAF	57.6	42.5	21.9	15.4	49.8

the blurriness between the banding actually making the transitions smoother. In terms of performance and in NVIDIA's defense, the company has stated that its driver team has yet to eke out more performance for that game in particular. Currently the champ is still the X800 XT, and with a decent amount of future titles being based on the CryTek engine, this is an important win.

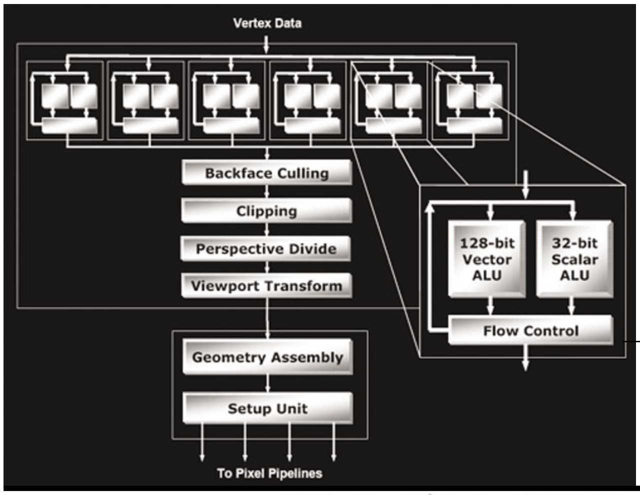
Older DX8 and DX7 games were all extremely fast, even with 4XAA and 8XAF turned on at 1,600 x 1,200 x 32, but that's to be expected. In any case, if you intend on playing some of your older favorites, none of the boards will do you any wrong. Unreal Tournament did show off a larger delta in favor of ATI, with even the lower-end X800 Pro beating the 6800 Ultra, which is certainly worth mentioning because so many games are still based on various iterations of the Unreal Engine. However, the newer UT2004 was a different story; it sees NVIDIA close the gap. Comanche 4 was a close-knit affair and there was really nothing in it when it came to Dungeon Siege or Splinter Cell, either. Newer D3D titles using Pixel Shader 2.0, such as Tomb Raider: Angel Of Darkness, did show off a considerable lead for ATI.

The debate over whether 3DMark is a valid benchmark and whether one set of drivers uses app detection optimizations still rages. Nonetheless, for comparison's sake, we were able to confirm ATI's claims of 2X the vertex shading performance, and although NVIDIA holds the "overall" top score mark, the difference is very negligible. When AA and AF are turned on, the tables are turned, and ATI's X800 XT steals the win.

NVIDIA's boards really shine in OpenGL games, and clearly ATI has some work to do in the driver department here. Call Of Duty, while fast on both ATI boards and barely slowing down once AF and AA are turned on, is still 20fps to 30fps behind NVIDIA. Serious Sam 2 and Return To Castle Wolfenstein carried on the trend with the 6800 Ultra being up to 15% faster than ATI's best. Again, it's not as though the ATI boards ever dipped below acceptable frame rates—far from it.

Trying to pick one card over another is going to be difficult based solely on the tests we performed. They are inconclusive at the very high end, but what was rather surprising was just how well the cheaper X800 Pro held up at all our high-detail-level testing at high resolutions. Just goes to show you don't really need to spend the extra cash unless you're looking for bragging rights. Jumping up from previous-generation hardware does seem to be worth it for the serious gamer. The R420's overall performance has dramatically improved from the R3xx architecture, especially at higher resolutions with AA and AF turned on. In the process, ATI has done just as good a job as NVIDIA, if not slightly better due to the cheaper pricing. ▲

by Alex "Sharky" Ross



The R420 throws six pipes at vertex data.

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

OCZ 520ADJ PSU

520ADJ
$150
OCZ Technology
(408) 733-8400
www.ocztechnology.com

Meet the mother of all power supplies. OCZ's foray into PSUs is nothing short of stunning, both technically and cosmetically. With nickel-plated chrome finish, green exhaust fan LEDs, and wrapped wiring, you know you're in for a treat.

The 520ADJ boasts eight primary 4-wire Molex power connectors, another two 4-wire floppy connectors, two SATA leads, and an auxiliary connector, all of which sit on generously long lines. The 12V string sports both 4-pin and 8-pin connectors. Two of the Molex leads feature black connectors, black shielding sheaths, and capacitors and resistors behind the connectors. These are meant primarily for power-hungry video cards such as NVIDIA's 6800, and because the leads sit on dedicated circuits with no other connectors, you simply couldn't ask for cleaner power flow.

OCZ provides dials for fine-tuning each of the three power rails and places an LED indicator below each dial. A green light indicates that voltage is within 5% of optimal, yellow notes undervoltage, and red overvoltage.

At first, we questioned OCZ's decision to terminate its ATX bundle in a 24-pin connector and then include a converter for today's common 20-pin motherboards. But OCZ rightly reasoned that the industry switch to BTX and PCI Express will also have boards changing over to 24-pin ATX and 8-pin 12V lines, and it only made sense to offer a five-year warranty on a PSU that would be ready for products appearing in five months.

Under the hood the 520ADJ is wall-to-wall quality. That's 520W sustained, folks—not peak like most vendors quote. The heatsinks are far larger than those of most competitors; we never measured more than about 1% of voltage wiggle during boot-up, and variance was far less during even heavy load sessions. OCZ rates its two-fan PSU at 22dB during idle. Subjectively, we'd say that noise output is average for a performance PSU. We found no manual fan speed control or smart temperature control leads but then realized that rpms are controlled by load levels rather than temperature. Think about it: By the time the temperature level rises enough to need extra cooling, it's already too late. Load sensing is far more sensible.

Our experience with the 520ADJ was flawless. We have a new reigning king on our test bench. ▲

by William Van Winkle

LG L2320A LCD

L2320A
$3,299
LG
(800) 942-3786
us.lge.com

At 23 inches with a 1,920 x 1,200 widescreen (16:10) resolution, the L2320's key advantage is its A/V Media Center. This toaster-sized box sports a slew of ports: DVI-I/DVI-D, 15-pin D-Sub, DTV, HD component video, composite A/V, S-Video, audio, and power. The idea is to provide compatibility with essentially any video feed and let users select the input source with the bundled remote control. This could come in handy for switching between, say, two PCs or a PC and a gaming console on-the-fly. The box's other key benefit is that all of this cable clutter (including power) stays on the floor with the box; only one cable snakes up to the monitor.

We tried out the L2320A on a wide variety of applications and found that graphics and text were incredibly crisp. While the monitor specs a 25ms response time, we were unable to spot any ghosting during gaming or DVD movie playback. The horizontal and viewing angles list at 176 degrees each; whether LG achieves this is a moot point because by the time you get that close to a lateral perspective, you can't discern what's on the screen, anyway.

Brightness and contrast are 220 cd/m2 and 400:1, respectively. These aren't overwhelming numbers, so in real-world terms, we'll say that the L2320A is plenty bright under regular conditions. The contrast ratio is where the unit exhibits some small weakness. The blacks are not very black, and the end result is that while detail reproduction is excellent, the overall image seems a bit faded. White screens look admirably uniform from edge to edge, but a black screen shows backlight blooms at three points on our unit, particularly at the 2 o'clock and 8 o'clock positions. Those who enjoy viewing dark content in dark rooms may find this disturbing, but it is un-noticeable otherwise.

Our only other complaint is that while you can get 1,920 x 1,200 resolution on the D-Sub connector, the DVI output only hits 1,280 x 1,024.

With a gorgeous industrial design, excellent OSM controls via the remote, and a stunning display image, the L2320A is as impressive as it is expensive. Spend 10 minutes with one, and you'll never be happy with a 17-inch LCD again. ▲

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

Lighten Up.

It wasn't so long ago that if you wanted to bring your data with you, your hardware had to come too. Well, that's all in the past now thanks to the new SanDisk Cruzer™ Mini. At under half an ounce, the Cruzer Mini goes anywhere, and with up to 256MB of flash memory, it takes a lot with it. Hi-speed USB 2.0 compliant, SanDisk's Cruzer Mini lets you transfer data faster than ever before. And at less than 8mm thick, all it needs is a single USB slot. Just drag, drop, and go. It's all about convenience – no extra hardware, no worries.

So whether you're installing utilities or updating print drivers for the umpteenth time, you can take your files with you wherever you go – and you won't even need your dolly.

For more information on SanDisk Cruzer Mini, visit www.sandisk.com/smart

HI-SPEED USB 2.0

SanDisk®

SanDisk and the SanDisk logo are registered trademarks and Cruzer is a trademark of SanDisk Corporation. Other brands and products are trademarks of their respective holders.
©2004 SanDisk Corporation. All rights reserved.

SOYO SY-P4I875P DRAGON 2 v1.0 Black Label

SY-P4I875P DRAGON 2
v1.0 Black Label
$189
SOYO USA
(909) 292-2500
www.soyousa.com
CPU CPU C

At this late stage, you need some serious advantages to entice people to buy an 875-based motherboard right before Intel's next-generation 915/925 chipsets arrive. The SY-P4I875P is a decent board, but is it worth $169 right now? Let's see.

First off, DRAGON series boards are loaded with goodies, and SOYO delivers here. On top of the usual cabling, SOYO provides a 9-in-1 USB 2.0 flash reader box with 1394 and SPDIF ports. The software extras include Norton Personal Firewall, Ghost, and Antivirus from 2003, and a SPDIF backplane connector keeps you covered for digital 5.1. On the board, Intel's CSA Gigabit Ethernet controller and RAID-enabled ICH5R southbridge are accompanied by ALi's M5281, which offers RAID functionality to another pair of SATA ports and the extra two parallel ATA/133 ports. We also liked ALi's simple yet useful Windows-based RAID utility. So far so good.

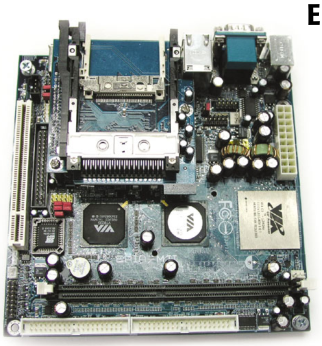
Then came the bad news: SOYO warned us before we agreed to review the board that the overclocking capabilities were limited here (you can't set the CPU voltage above 1.6V and instability sets in fairly early when frequency stepping), so we'll ignore that aspect. Our chief grief was that we couldn't install Windows XP onto a SATA drive—as in we couldn't ever reach the part where you press F6 to load the SATA driver. So we installed to a PATA drive, got that working, and then added SATA drives back into the system with no problem.

Next, we swapped our original 3GHz P4C chip out for a 3.4GHz Prescott, only to find that the system recognized it as 2.8GHz, the classic sign of an old BIOS. Only this version 1.0 model is supposed to support Prescott. We downloaded the latest BIOS, which on top of promising Prescott support also lets you disable SATA ports 3 and 4, but still couldn't run our P4E chip beyond 2.8GHz. When we switched to a 3.4GHz P4C (Northwood), it ran perfectly.

On performance, SOYO scores solidly, ranking alongside the likes of ABIT's AI7 and Intel's own D875PBZ. Is the package enough to persuade an upgrader? Probably not. DFI's Canterwood LAN-Party board is only five bucks more, and ASUS' legendary P4C800-E is only $179. Ten bucks and a flash card reader aren't enough to compensate for a flaky SATA subsystem and questionable Prescott support. ▲

by William Van Winkle

VIA EPIA MII12000 Mini-ITX



EPIA MII12000 Mini-ITX
$180
VIA Technologies
(415) 389-1700
www.via.com.tw
CPU CPU CPU C

We all need some computing security. The key is encryption, and right now the U.S. government-approved AES (Advanced Encryption Standard) is about as good as widely available encryption can get. But running AES encryption in software can be a huge drain on system resources.

VIA built an AES cryptography engine into its C5P Nehemia processor core, allowing this crunching to happen in a dedicated hardware zone. Our MII12000 board integrates a 1.2GHz processor, and we used VIA's AES Encryption Benchmark (www.viaarena.com/?PageID=405) to compare performance against a system running a 3GHz P4 Northwood. With 128-bit keys, the CFB (Cipher Feedback Mode) returned an encryption time of 0.125 seconds running in software on the P4 system. On the MII12000, software encryption came in at 0.931 seconds, but the hardware time was a mere 0.02 seconds—six times faster than a 3GHz P4. With 256-bit keys, VIA's chip still maintains a roughly 6X advantage over Intel.

CyberScrub uses VIA's random number generators to create the noise values that will scrub drive sectors so the rest of the system doesn't have to, a feat that CyberScrub says results in a roughly 50% performance improvement. Soon, CyberScrub will also be able to wipe data on drives across the LAN.

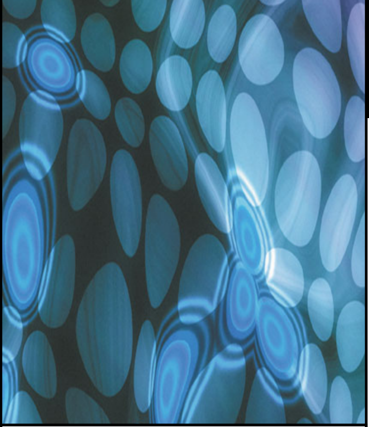
Increasing amounts of download content will be sold with encryption built into the DRM. The impact of decryption on system resources can be significant (80% to 100% CPU utilization), and being able to offload this work to the encryption core will pay dividends. It will also mean you'll be able to do things like watch DVDs and play games with little to no noticeable performance hit while other apps are encrypting/decrypting in the background.

That said, don't even think about using the MII12000's UniChrome IGP for gaming beyond casino and board games. But DVD playback looks quite smooth and complements the respectable 5.1 surround sound pumping through VIA's Six-TRAC codec. The board features 10/100 LAN, SDPIF or TV-Out, FireWire, USB 2.0, one DDR266 DIMM slot, one PCI slot, and an integrated CardBus and CF reader. There are two ATA/133 ports but no SATA, which is probably the board's biggest drawback.

We wouldn't suggest the MII12000 as a base for your main PC, but it's a great foundation for a storage system, living room SFF box, or other secondary machine where privacy needs to be balanced with common application performance. ▲

by William Van Winkle

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect



Anand's Corner

by Anand Lal Shimpi

Saying "I Do-than"

Anand Lal Shimpi has turned a fledgling personal page on GeoCities.com into one of the world's most visited and trusted PC hardware sites. Anand started his site in 1997 at just 14 years old and has since been featured in USA Today, *CBS' 48 Hours and* Fortune. *His site—www.anandtech.com—receives more than 55 million page views and is read by more than 2 million readers per month.*

Intel's Pentium M processor (the brains of Centrino) has been updated. Unlike the most recent desktop P4 release, there are no grey lines of confusion here. Internally referred to as Dothan, the new Pentium M is a 90nm version of 130nm Banias (the core which it replaces).

From a high-level standpoint, Dothan (pronounced doh-thahn) is a die-shrink of Banias. The move to 90nm reduced power consumption and transistor size, allowing Intel to drive up clock speeds, as well as pack more hardware onto the chip. Dothan is available in clock speeds of 1.7GHz, 1.8GHz, and 2GHz, and L2 cache size has been doubled to 2MB, but there are some other refinements in the hardware that help improve performance over Banias.

Unlike the Northwood-Prescott migration, the Banias-Dothan shift didn't encompass changes to the pipeline, as such a move would be far too risky for a mobile chip still in its infancy. Instead, Dothan's improvements were mostly localized performance tweaks that were ready at Banias' launch but kept out of the original design because of strict release schedules. Intel didn't want to delay Banias and thus a number of things that could have made it into Banias had to wait until Dothan.

Intel wants to transition to Dothan as quickly as possible . . .

Individually, the improvements are fairly minor, but when put together, they end up yielding a decent performance advantage for Dothan over Banias at the same clock speed:

- Improvements to the micro-ops fusion engine
- Small code loops can now benefit from better branch prediction
- Reduction in Integer Division latency
- Partial Register Access followed by a Full Register Access no longer causes the pipeline to stall
- Better data prefetch (matched up with the larger cache)

Unlike Banias, Dothan was late to the show—and not just a little late. Chips were in the hands of OEMs five months ago, but an analog circuit bug required an additional revision of the silicon before bringing Dothan to market, which significantly pushed back its release.

Dothan is still being branded as a Pentium M processor, and if a notebook vendor chooses to use a Dothan along with Intel's 855 chipset and Intel's Wireless controller, then it can call the whole package a Centrino notebook, just as with Banias. Intel wants to transition to Dothan as quickly as possible and thus at equal speeds, Dothan is priced identically to Banias.

Along with higher clock speeds, more cache, and tweaked internals, Dothan is also the first Intel processor to boast Intel's new naming system. Somewhat like AMD's attempt to depart from clock speed defining processor names, Intel is attempting to do the same. The Dothan-based Pentium Ms will be sold as Pentium M 755, Pentium M 745, and Pentium M 735, running at 2GHz, 1.8GHz, and 1.7GHz respectively.

Intel will eventually extend their model numbers to all processors, with the basic scheme being the following:

7xx series – Pentium 4 Extreme Edition and Pentium M processors

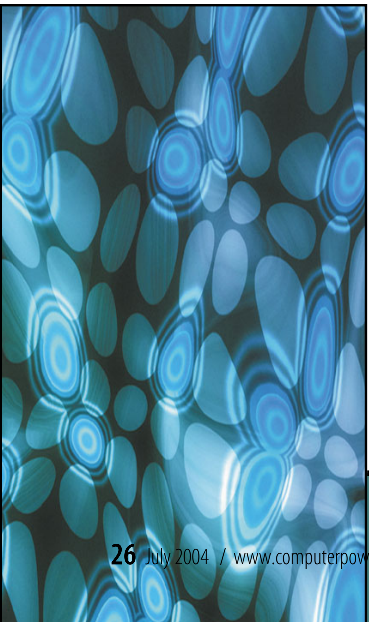
5xx series – Pentium 4 and Pentium 4 M processors

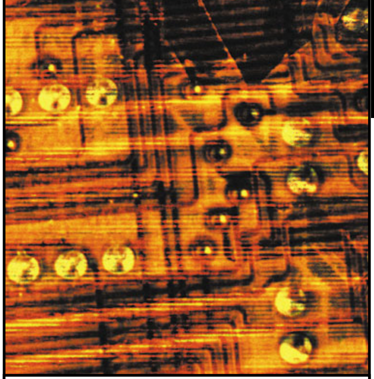
3xx series – Celeron and Celeron M processors

The move to a model numbering system was necessary because of the situation created originally by Banias, where a much lower clocked Banias (for example, 1.6GHz) was able to outperform a much higher clocked Pentium 4 M (for example, 2.4GHz). Intel introduced the model numbering system to avoid confusing consumers, which is interesting because Intel has been a harsh critic of AMD's policy of model numbers in the past.

But as far as Dothan goes, it simply makes the Pentium M/Centrino offering all that more compelling. Clock for clock, Dothan is at least 5% to 10% faster than Banias depending on the application. Combine that with the higher clock speeds offered by Dothan and the platform becomes even more tempting. If you can wait, Dothan will be moving to higher clock speeds and receive a faster 533MHz FSB late this year to improve performance further. Obviously the performance improvements will be at the expense of battery life, so if you're happy with the longevity of current Dothan platforms, then there's no need to wait to go out and buy that new toy . . . er, work notebook. ■

Anand is listening at Anand@cpumag.com.

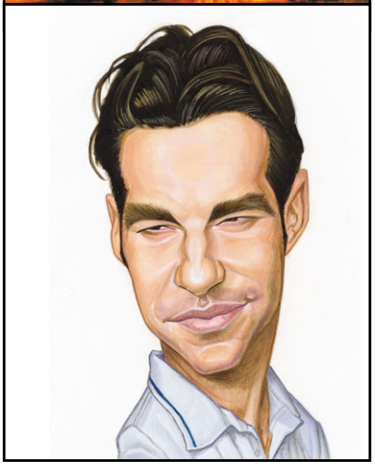




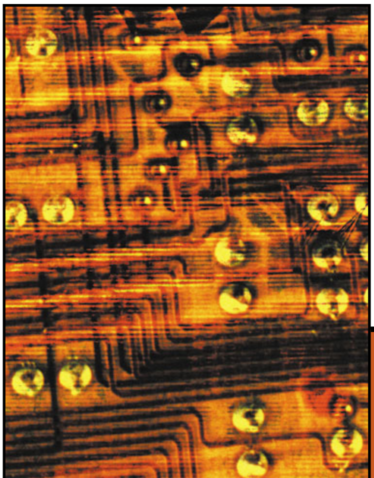
The Shark Tank

by Alex "Sharky" Ross

The 3D Land Of Confusion



Disrupting Reuters' newswire with a cheery Christmas greeting at age six, Alex "Sharky" Ross became an avid computer user/abuser, eventually founding popular hardware testing/review Web site SharkyExtreme.com. Exposing shoddy manufacturing practices and rubbish-spouting marketing weasels while championing innovative products, illuminating new technology, and pioneering real-world testing methods was just a front for playing with the best toys. The site acquired, he left in 2001. A London native and London School of Economics graduate, Alex currently swims in Silicon Valley.



I've spent the best part of the past few months with both ATI's and NVIDIA's new architectures, and I'm still unclear as to where the chips will fall. From an architectural standpoint, NVIDIA's hardware is more forward thinking and advanced, with support for PS3.0 and full FP32. But it draws so much power in its high-end form and still isn't on store shelves. From a practicality standpoint, ATI's hardware, with its lower power consumption, single-slot solution is much more in tune for OEMs and the majority of end users.

It's going to be awhile before FP32 and/or PS3.0 games appear, so perhaps for this cycle ATI can be forgiven for that omission. However, performance numbers have shown ATI currently slightly in the lead in some key areas, such as Far Cry and UT2004, and the X800 XT Platinum Edition has a $100 price tag advantage over the 6800 Ultra, too. Both companies have been releasing new drivers every week or so with claimed bug fixes and performance improvements, making it harder and harder to choose one over the other.

But what on earth is going on? Every second week I get a new email from each company announcing "Our new limited edition, SuperFast GFX Ultra XT Turbo XT Kompressor AMG, Dinan, RUF" card to try to one up each other. The latest is a "Golden Sample" (as Gainward likes to call it) Geforce 6850 Ultra, which will literally be handpicked from the 6800 Ultra pile for its ability to run in excess of 1.1GHz memory clock and 450MHz engine core speeds. Perhaps a more likely candidate for most of us will be the 6800 GT targeting a $399 price point with a 16x1 architecture but clocked to an engine core speed of 350MHz and less aggressive 1GHz memory speeds. From an OEM standpoint, the power requirements will be much more realistic with 300W PSUs being penciled in favor of those 480W monstrosities. NVIDIA and ATI have both stressed how parallel their architectures are, and with that in mind, even if clock speeds are detuned and certain pipes closed off, the features will at least remain the same across the board, so we won't have another GeForce4 MX situation again.

I fear a lot of these will end up being paper releases and, due to the extremely low likelihood of yields ever being good enough, simply handpicked boards that are "engineering anomalies/miracles" that can run at crazy speeds so that the PR/marketing guys can throw rocks at each other. What's the point? The point is that with ATI and NVIDIA on such a level playing field, both companies will probably start getting "creative" in an attempt to further differentiate their products. It's going to get confusing not just for us, but also for the OEMs, especially the ones that end up selling NV40- and R420-based products. OEM partners currently still selling the previous-generation hardware haven't exactly been betting on one vs. the other. Some haven't even announced follow-up products yet. Throw in the forthcoming PCI Express versions of the same technology, and we're looking at Baskin Robbins 32 flavors of GPUs. At least ice cream will be in season for the hot midsummer, when these boards actually come to market.

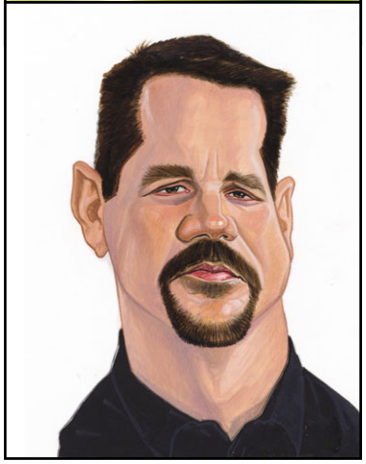
> **I fear a lot of these will end up being paper releases.**

So I've been sitting here reviewing the new Radeon X800 XT Diamond Edition Hennesey HEMI, pitting it against my own GeForce Ultra Twin Scroll Turbo, with a direct port wet Nitrous Kit in case NVIDIA needs to spray a Sneaky Pete shot should ATI come close. Any advice on what to buy? Just sit tight a few more months and wait for OEMs to actually start shipping final product with final drivers and see what happens. Both cards are fast but neither is cheap, and the jury is still out on which one is the champ where Half-Life 2 and Doom 3 are concerned. No longer is there a wide gap between ATI and NVIDIA, but there's still a gap between extremely capable hardware with a ton of unused features and software that may or may not take advantage of it in the distant future. ■

Email sharky@cpumag.com a creative new product name, and I'll send it to ATI/NVIDIA.

by Kyle Bennett

PCI Express For Yourself?



Kyle Bennett is editor-in-chief of HardOCP.com (hardocp.com), one of the largest and most outspoken PC-enthusiast sites on the Web. HardOCP.com is geared toward users with a passion for PCs and those who want to get cutting-edge performance from their systems. Beware, though, Kyle is known for his strong opinions and stating them in a no-nonsense manner while delivering some of the most in-depth reviews and PC hardware news on the 'Net.

Many of you want to know if you should wait for PCI Express X16 video cards or go ahead and purchase another AGP card. The easy answer is, "Some of you should, and some of you shouldn't." First, we need to look at the differences between AGP in its 8X incarnation, which is, of course, the mainstay of today's enthusiast video cards, and PCI Express X16, the future of video cards.

For the purposes of this article, there are only two real differences. First, just to be clear, AGP and PCI Express cards will not work in the same slot. The second difference is the supported bandwidth across each interface. AGP 8X supports up to about 2.1GBps in one direction out to the video card. PCI Express X16 supports 16 lanes of data that will allow for 4GBps in each direction, or 8GBps. NVIDIA has told us that approximately 25% of that bandwidth is consumed by other information needed to make the bus work, effectively giving you 3GBps of "real" data each way. Most of the marketing you'll see shows PCI Express at 8GBps compared to AGP 8X at 2GBps, but in today's reality, all that 8GB of bandwidth simply is not used by games. Also take into account that if you benchmark the same video card using an AGP 4X (1GBps) bus and then an AGP 8X bus, you'll likely see very little performance increase and none that would reflect a better real-world gameplay experience. All in all, today's AGP 8X isn't even being taken advantage of by game-content developers.

If you're looking at being first in line to buy a PCI Express X16 video card the moment they hit store shelves, you're likely not going to see any real gaming benefits from it unless you plan on keeping the card for a long time. That said, it's very likely the PCI Express technology will be very beneficial some year soon.

By July we will start seeing motherboards with PCI Express X16 slots for video cards, sans AGP. In fact, new Intel chipsets i915 and i925 will not support AGP at all. It seems as though all motherboard chipset makers will forsake AGP on their PCI Express motherboards for their newer chipset products—except one.

VIA has a very lofty goal: It's looking to be the only tech company to offer a dual video-interface solution that includes AGP and PCI Express. This means that VIA is looking to facilitate motherboard companies building motherboards with both AGP and PCI Express slots for video cards. You wouldn't be able to use them for video at the same time, but this would certainly open an upgrade path that no other would offer. At the time of writing this, VIA has expressed to us that its dual-interface solution should be ready in July, at the latest. You'll likely see this feature on the VIA PT890 chipset.

VIA looks to be working hard for you AMD fans out there, and it seems to us that there will be many more of you after AMD launches its new 939-pin CPUs in mid-June. The VIA K8T890 chipset will contain the same dual interfaces, AGP 8X and PCI Express X16, as the PT890. We have yet to test either of these chipsets but very much want to see both succeed, as they could certainly be a value to anyone who owns an AGP card that they want to keep for a while when transitioning to other new technologies.

> VIA . . . is looking to be the only tech company to offer a dual video-interface solution that includes AGP and PCI Express.

If the video card you want to purchase will soon be offered in PCI Express and you're looking to upgrade your motherboard at the same time, there's no reason not to go with PCI Express. If you want to buy an AGP video card today and want your video card investment to last you awhile, it looks as though VIA will (hopefully) be coming to our rescue with two chipsets that will likely allow for a smooth upgrade path for us AGP graphics users. Looking at the big picture, if you bought a $500 AGP video card today, you'll likely have enough system to carry you through the life of the video card. ■

Talk with Kyle at kyle@cpumag.com.

The Company That Wired the Network Now Unwires it

Introducing the 3Com® Suite of 802.11 Wireless Solutions

Imagine untethered network and Internet access from anywhere in your home or office. 3Com® brings freedom of choice to wireless with one of the most comprehensive wireless networking suites on the market today.

3Com wireless products come in a variety of price points and are scalable from home and small office to enterprise solutions. Our OfficeConnect® line for home and small offices is among the first to ship with the latest 802.11g standards and new 256-bit Wi-Fi Protected Access (WPA) encryption security.

Our enterprise-class products include an 11a/b/g PC Card with patented XJACK® antenna and dual-mode upgradeable access points that offer you the freedom to mix and match 802.11 a, b, or g standards to meet different coverage and bandwidth needs, and featuring the latest suite of security standards enabling customers to match the level of security to their specific environments.

Best of all, every 3Com wireless product is backed by 30 years of Ethernet networking expertise.

Feel free to unwire your office. Visit www.3com.com/shop today to find the 3Com wireless solution that works best for you.

3Com® OfficeConnect® Wireless 11 a/b/g PC Card, 11g Gateway

3Com® 11a/b/g Wireless PC Card with XJACK® Antenna

3Com® Wireless Access Point 8750

Tri-mode. Upgradeable.

To find a reseller nearest you, go to: www.3com.com/locate_reseller

CDW

Insight High Tech Low Cost Smart Business

PC Connection

PCMall

Copyright © 2003 3Com Corporation. All rights reserved. 3Com, the 3Com logo, OfficeConnect and XJACK are registered trademarks of 3Com Corporation. All other product names may be trademarks or registered trademarks of their respective companies.

PC Modder

Tips & Tutorials

Modding does the body good. A PC's body anyway, inside and out. Here you'll find hardware, firmware, tools, tips, and tutorials for modding your rig's performance and appearance. Send us your own mod-related tips and ideas at modding@cpumag.com.

Modding enthusiasts have a penchant for the latest toys. Fast processors, powerful video cards, silent SFF enclosures, and radically lit motherboards are all fair game when it comes to a modder's creative mind. Recognizing the appeal of unconventional customization, an entire industry has emerged to support the community.

Mods & Ends

Enermax Coolergiant EG485P-VHB PowerSupply

If you're impressed with the NVIDIA GeForce 6800 Ultra's performance and are ordering from McDonald's 99-cent menu to save money, make room in your budget for a new power supply, as well. NVIDIA recommends at least 480W.

The Coolergiant EG485P-VHB ($110) comfortably meets NVIDIA's recommended power specification by delivering a total of 480W. More importantly, it offers independent 12V rails with a combined 31A of current. The +5 and +3.3V rails boast 40A and 34A, respectively.

Inside the unit's golden aluminum housing are one 70mm axial fan, one 80mm axial fan, and a blower that pulls heat from the motherboard. The Coolergiant keeps the fans running at least two minutes after you've powered down to continue removing heat and extend the life of vital components.

The Coolergiant cools your system even after it's turned off to protect sensitive components.

Compliant with the ATX v1.3 specification, Enermax guarantees that the Coolergiant works with both Athlon 64 and 90nm Pentium 4 processors. The unit comes with SATA power connectors and an extra 4-pin header specifically for graphics cards. Pricy as it may be, the EG485P is a great addition to any high-end system with lofty power demands.

Vantec NexStar External Hard Drive Enclosure

There are plenty of options for mobile storage. USB flash drives, rewriteable DVD media, and CDs work well. You can't back up a 20GB MP3 archive on them, though. For high-capacity storage that's easily accessible, hard drives are still the way to go.

A lot of external hard drives are bulky and most require AC power, however. Vantec's NexStar ($25) solves that problem with a slim aluminum housing that accommodates 2.5-inch IDE hard drives (commonly used in notebooks) and draws power from a USB port. It's hot swappable and doesn't require special drivers unless you are using Windows 98SE. You'll need a hard drive, of course, but 40GB drives are readily available for less than $100 online.

Zalman Reserator 1

The Zalman name is synonymous with quiet, efficient cooling, so it's not surprising it is exploring watercooling with its latest design. Unconventional? To say the least. Does it work? Better than you'd imagine.

The Reserator 1 ($290) is comprised of a combined reservoir and radiator with an integrated pump. It's an impressive piece of work, standing 2 feet tall and built of blue anodized aluminum. Of course, most cases can't accommodate the massive cylinder, so Zalman includes a base on which the Reserator rests.

Because it doesn't come with a conventional radiator and fan, the Reserator won't dominate cooling performance tests, but it operates without the aide of a fan and is consequentially silent. Even the included water pump is hardly audible.

At 2 feet tall, the Reserator is the first commercial fanless watercooling kit.

Fashionably Fresh Firmware

D-Link DI-624 Rev. C

D-Link's DI-624 802.11g wireless router receives upgraded performance and numerous bug fixes in this update. Revisions A and B aren't supported.

support.dlink.com/products/view.asp?productid=DI%2D624%5FrevC

Creative Labs Wireless Music v1.20.05

The update to Creative's remote controlled wireless music receiver adds a power-saving sleep mode, enables direct selection of receivers, and increases artists and albums available on the remote.

us.creative.com/support/downloads/download.asp

Pioneer DVR-107D 8X DVD±R/RW v1.13

With v1.13, Pioneer has managed to improve 4X ±R write performance on its DVR-107D, plus add support for writing at 8X on the new CMC media.

www.pioneeraus.com.au/computer/firmware.html

Apple Bluetooth Firmware Updater

Improved performance, a better installation routine, and support for startup key commands are all in this firmware from Apple for PowerBooks and PowerMacs.

www.apple.com/support/downloads/bluetoothfirmwareupdater.html

by Chris Angelini

Building "Spike"

The Diary Of A Modder's Creation, Part I

Over the course of the next two months, we will follow the progress of modder Gareth Powell as he creates from scratch a modded system dubbed "Spike." This month, Powell provides some of his background in the modding world, as well as what exactly he has in store for Spike.

My name is Gareth Powell, and this is my diary. To some of you, I'm known better as Lord Pheaton. I'm the founder of Pheaton.com and the infamous Pheaton forums. Pheaton.com was one of the first Web sites targeted at the hardcore modding enthusiast.

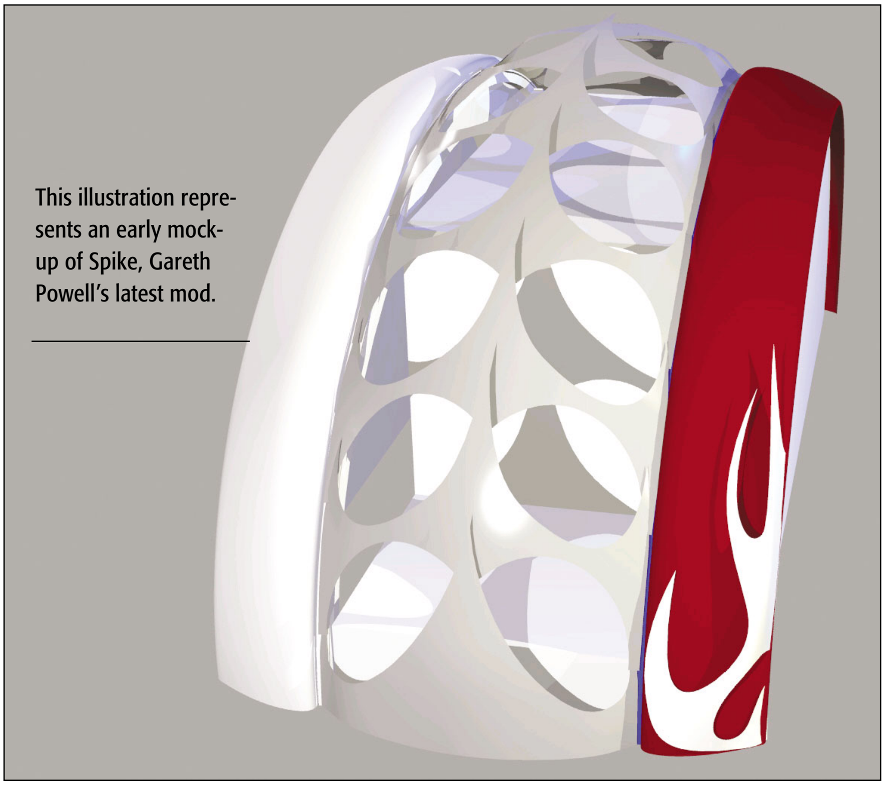
From an early age, I've been drawn to technology and computing. Many people have said I have a natural ability when it comes to working with computers and electrical equipment. I got my start in computing in high school, where I was promptly banned from ever taking another computing course due to my ability to figure out the instructor's passwords, even though I technically didn't alter anything. Apart from that one high school course, I have no formal training; everything I've learned has come from my passion for the industry and my addiction to technology. And I mean addiction. I spend a good portion of my free time reading white papers and researching new products, partially for incorporation into my mods and partially to satisfy my own fascination with this stuff.

In 1996 I got the opportunity to work with a cable company testing one of the first broadband Internet services in Canada, where I then lived. This is when I got interested in broadband gaming, which eventually gave way to me trying to drain every ounce of gaming power out my system. Soon I was headlong into upgrading and system tweaking. I was apprehensive about working with components initially, but after my first system upgrade, I took to it like a duck to water.

A Flamejob Is Born

I got my start in modding in 1999. Cooling issues with my K62 550 made the system idle at a far-from-comfortable 76 degrees Celsius. Thermal alarms embedded in my system's motherboard would go nutty as the CPU temperature rose above 90 degrees during gaming sessions, so I needed to do something just to keep my sanity. After trying bigger and better heatsinks, replacing the stock case fans with Panaflos, and cleaning up the rat's nest of wiring inside the case, the system still had cooling problems. I had no choice but to go looking for other options.

Not wanting to make the stride to watercooling for a stock clock, I had no choice but to add more fans to improve the airflow. So I set off on my first mod project: a top blowhole. In retrospect, it would have been easier if I had used a hole saw rather than a rotary tool, but the temperature change was still dramatic despite the shoddiness of the work. It was at this point that I found myself hooked. I proceeded to add more cooling upgrades to my stock Iwin case. While searching overclocking and tweaking forums, I was


This illustration represents an early mock-up of Spike, Gareth Powell's latest mod.

surprised to find people doing the same modifications that I had been doing, and even more. Case windows were cutting edge at that time, and after adding one to my case, I decided to use a case window as the inspiration for my first "extreme mod."

Flamejob was the first extreme mod that Gareth Powell completed, and it still holds a special place in his heart.

Flamejob was basically a case that I cut in half. The case's back portion was then rebuilt out of acrylic to accentuate the side and top panel, which were cut out in a custom flame design. In retrospect, it wasn't the best case mod ever, but it was innovative and holds a special place in my heart and my storage locker. Someday I hope to redesign and upgrade it.

Soon, I moved on to build other cases, including Technotone, a 1940s-era console radio retrofit, complete with a pop up 15-inch display. Frostbyte was a small but powerful all-in-one system fashioned after a light-up ice cube I took home from the Intel Developers Forum. Most recently I created Scarab, an organically designed fiberglass SFF system that resembles the curved body of a scarab beetle; it's finished with one hell of paintjob.

Frostbyte mod was fashioned after a light-up ice cube.

I have created many other mods, some of which were catastrophic failures and others that were designed and built specifically for clients. I have even done Xbox consoles for a few people. I'm one of the lucky few who makes a living from modding. When I'm not building or designing cases for clients, I spend my time doing product design consulting, working the Pheaton network, and of course, freelance journalism.

Making Art

Although case modding is a fledgling industry still really in its infancy, its growth has been phenomenal and its impact on the computing market has been noticeable. It isn't easy making a living in the market, but I am doing something I love, and I prefer my happiness to the almighty dollar.

Most of the competition pieces that I do are self-financed, but I do get some help from sponsors, such as Intel (which has donated a 3.2GHz Extreme Edition for this case) and NVIDIA, which are gracious enough to supply me with some of the mod components. This lets me dedicate my budget toward the development of the case rather than worrying about the cost of parts. Even with these donations, my cases can get very expensive. Some have cost upward of $5,000 to produce.

I consider modding an art form that melds technology and ingenuity, yet I'm still true to the foundation in which modding was born: cooling. No matter how good a system looks, it's useless if it's unstable due to overheating. Cooling is always an important aspect I consider when designing a new case. I also believe that a mod should have a purpose, and the design should reflect that. For example, there's no point to building a LAN rig that lacks the power to play games.

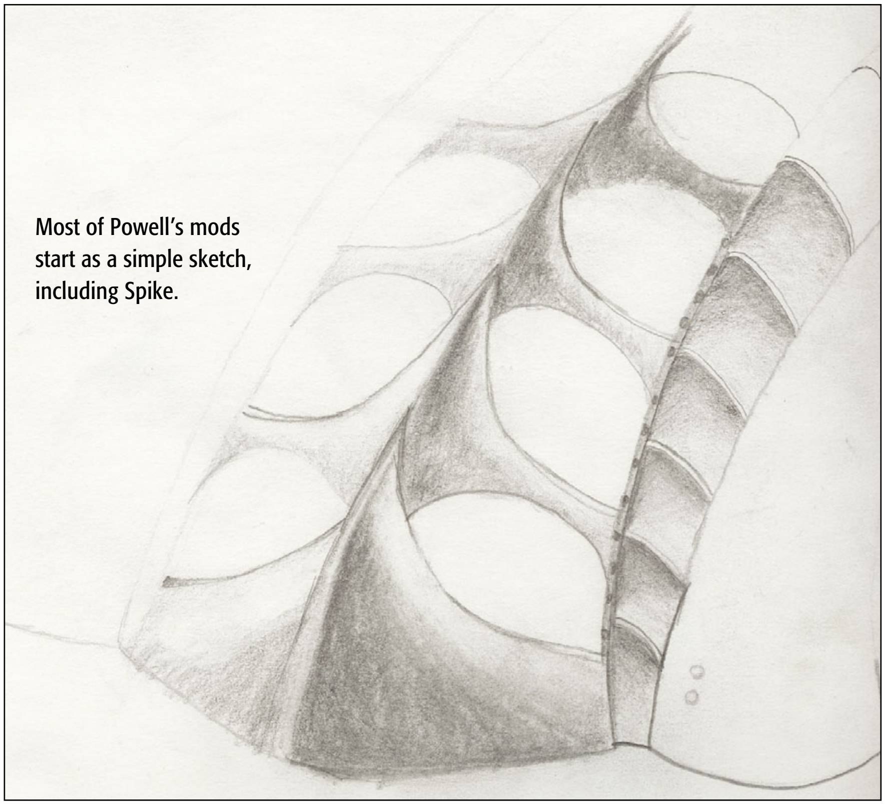
Like many ideas, most of my cases start as nothing more than a sketch on a piece of paper or napkin. I find inspiration from everything around me: architecture, automotive designs, and even homes. All these environmental influences factor into a design. Some of these influences are incorporated into the case consciously, and some are not. Regardless of the origin, there's no denying that their influence plays a part in it, even if I don't know what exactly that is.

My latest endeavor, Spike, was conceived around June 2003. Although the original arc shape of the case hasn't changed, almost everything else has. The original inspiration came from the front grill of an old Rolls-Royce, with the contoured shape and linear aspects of the chromed grill sticking in my head. I then fashioned the idea of a system grill and the concept of linear airflow and came up with a design that was very linear. In the design, a car-like grill flowed straight from front to back, echoing the curve of the arc shape. Although I liked the concept, I felt unsure about its minimalist properties and shelved the design. Over time, I kept coming back to the concept and adding and taking away things. Then, of all things, the design's spikes started to take shape out of spider webs.

Spike's Inspiration

Soon, Orange County Choppers' Black Widow Bike (www.orangecountychoppers.com/themes.php) became the inspiration for the case's spikes, specifically the spider web chrome of the bike's rear fender. The shape of the fender is similar to the case's arc shape, and I decided to give the spider webs a try instead of the straight grill bars. Unfortunately the spider web pattern did not fit with the concept as well as I liked, but after a few bad drawings, the spikes started to take shape.

It's no secret that I can't draw. I can build complex things, but I struggle with stick figures. Therefore, I work out all my designs in my head and express them the best I can to my artist, Travis Jackson. This is a long and drawn-out process that's frustrating to both of us, yet through this process I'm able to work out



Most of Powell's mods start as a simple sketch, including Spike.

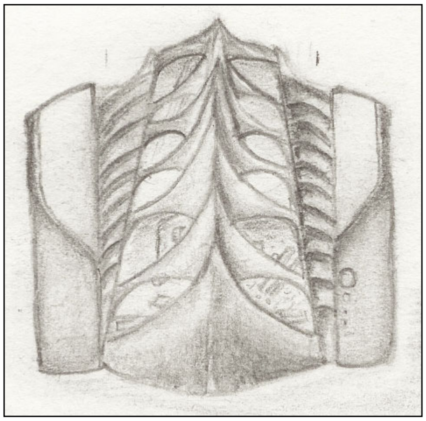
the finer details in my head. We come up with an image I can then share with others, which works better than me trying to express it with words.

Using this process, I conceived the spikes and eventually incorporated them into the design as the main focal point of the case. Eventually, the spider webs were joined to make crude spikes, and from this Travis came up with the conceptual drawing that, after many revisions, has become the design I'm building.

Technical Aspects

All my creations are designed on a principal of airflow, but the concept of linear airflow went out the window when this case was redesigned. Therefore, Spike is designed on an open airflow architecture, which I stumbled on while incorporating the thermal convection idea I used in Scarab. There are no case fans or cooling in this case other than the processor heatsink and fan and the graphics card cooler.

Everyone knows that heat rises, and the open construction of the spikes allows the heat to dissipate naturally while cool air is passively drawn in from the base of the case. Although this goes against almost every principle of cooling and enclosure design, where is it written that a computer case must be completely enclosed? The Faraday Cage went out the door with the invention of the case window, so why hold on to the foundations of a complete enclosure?



This preliminary sketch shows what Spike will look like from head-on view.

The open-airflow architecture only provides the design with a clean interior look, but the downside of the open design is that any excess noise will be very noticeable, and there's nothing as annoying as the whining drone of a high-speed fan. I'll be using low-noise fans on the heatsinks to keep the ambient sound to a minimum.

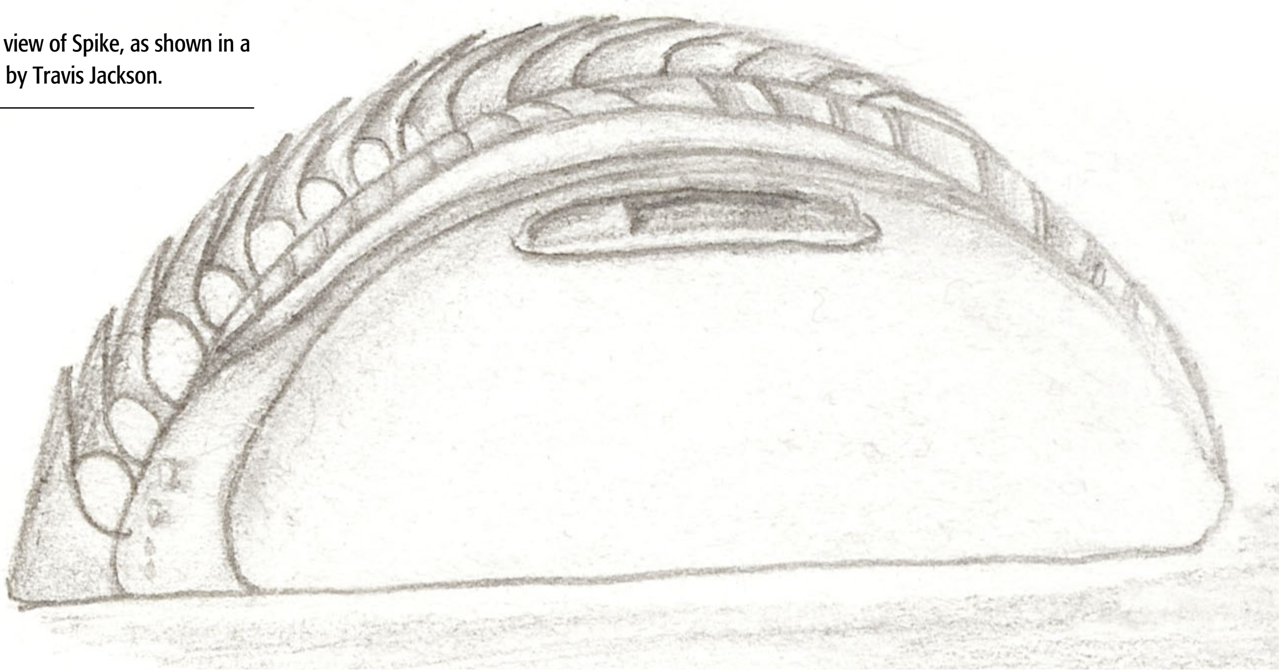
The case will consist of three main parts: the aluminum substructure, the fiberglass side panels, and the spike assembly. The substructure is where the construction gets its strength. All the other parts will mount to it, so it needs to be strong. It will consist of a flat base panel and two lengths of square aluminum tubing bent into the arch shape. It will then be braced at the rear so that the motherboard's backplane can be mounted. The motherboard tray will also be mounted onto this frame. At the frame's front, I'll mount the drive bays so that the hard drive and CD drive can be mounted.

The side panels will be molded in fiberglass, which will require making a blank for each panel so that I can make a mold for the panel to set in. This will be labor-intensive, and even though it seems like a simple part of the project, it will take a considerable amount of time to actually manufacture. These panels will then attach to the substructure. Although the panels are mostly for aesthetic purposes, they will hide the power supply and wiring.

The spikes are the main focal feature, but they will also have a purpose. This system will still be functional, so it needs to be easy to work with besides being attractive. Because the side panels won't be easily removable, I've devised a system so that I can easily remove the spikes in sections.

The spike assembly has two parts: the rear panel, which pulls way so you can gain access to the back panel (this also masks the cabling), and the front assembly, which I can remove so I can easily access the components.

The last major feature is the hard drive cage and stealthed DVD drive. The cage will mount at the front of the case near the bottom. This is the most logical place because I have decided to stealth the



A side view of Spike, as shown in a sketch by Travis Jackson.

DVD drive by attaching the starting spike to the drive bay so that it pops out, letting me place a disc in the tray.

Let The Light In

Lighting is always an important element of my mods, and this system is no different. I like to use blue lighting mostly, but this case is such a drastic diversion from my previous creations that a new lighting scheme will be a welcome change.

I've decided to go with a red-lighting scheme mixed with some white light for added effect. The only problem is that I want a deep red color, and the majority of the red cold-cathode lighting available is more of a sad pink. Therefore, I will actually be using white cold cathodes tinted to a deep red using industrial lighting gels. The gel gives me a much wider selection of color tones than available on the market. I'll be able to pick and choose a combination of gels until I get the exact color I am looking for, while still keeping the large light volume that cathodes are known for.

To balance the red, I plan on using high-intensity white LED's to accent the spikes. This is the most experimental part of the design, and it may not work. Therefore, I consider this to be a secondary feature. I plan on using the LEDs in a spread-spectrum pattern and hiding them behind the spikes on the front of the case. This will bathe the polished aluminum spikes with light, making them glisten. I'll tie the wiring for the LEDs into the 12-volt line via a quick connector so that I can still remove the front spike assembly easily.

I put a great deal of thought into the colors, and after many hours of researching, I have decided to use "boyds red," named after famed hot rod maker Boyd Coddington. (I'm hoping to do the actual paintjob in his shop.) The color is a clean, bright red with no brown tones, so it should fit well with the polished-aluminum finish of the spikes. The deeper tone of red will also give the project depth.

To break up the monotone nature of the side panel, I'll add some chrome accents, such as pin striping. I may even make the side two-tone, but that's something I'll decide closer to finishing. Like the chrome piece on the sides, I won't know what this will look like until I have the case sitting in front of me.

In a perfect world, everything will go smoothly during this build, but things rarely go as planned. There are bound to be some surprises and setbacks, especially when deadlines and cut-off dates come into play. Case modding is in some ways similar to prototyping, except you're trying to get it right on the first try rather than going through many revisions. Because of this, I spend a lot of time planning a project rather than jumping into it headfirst, which I've learned through experience isn't the best way to do things. With that said, nothing is written in stone, and being flexible enough to change a design and humble enough to realize there may be design flaws has become second nature to me. There is no room for pride or ego when a deadline looms near.

With every project there are many things I would like to include but time doesn't allow for. For Spike I'd like to accessorize the unit with a keyboard and mouse that has a matching paint job and chrome accents. This is a very feasible addition, yet time may not allow for it. I also would like to modify a 19-inch LCD to contrast with the case. However, the case has to be built, tested, and running perfectly in time for the Cyberathlete Professional League's summer event, where Spike will be officially unveiled. I've allowed for extra time for setbacks, but I have committed myself to this design, and I have no choice but to get it done. CPU

by Gareth Powell

IT'S SHOWTIME

DIGITALMOVIE™ DVD

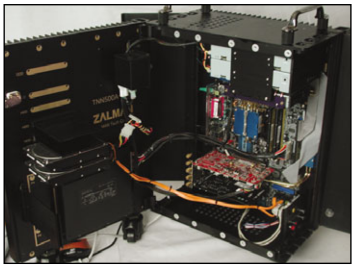
Talk about box office hits. Verbatim's new DigitalMovie™ DVD recordable media is so hot you can almost smell the popcorn. Available as DVD-R or DVD+R, this 4X speed DVD media looks – even feels – like a Hollywood movie reel. But don't think you need a director's chair to use them. These mini-reels are perfect for home movies, business presentations, transferring files – anytime you want to add a little fun to the show. And of course, DigitalMovie DVD has the same unsurpassed performance and reliability you've come to expect from Verbatim. So make your next show a feature presentation. DigitalMovie DVD from Verbatim. It's the reel thing. For more information, contact us at 800-421-4188 or online at www.verbatim.com.

Verbatim.

PUT YOUR WORLD ON VERBATIM

© Verbatim Corporation 2004

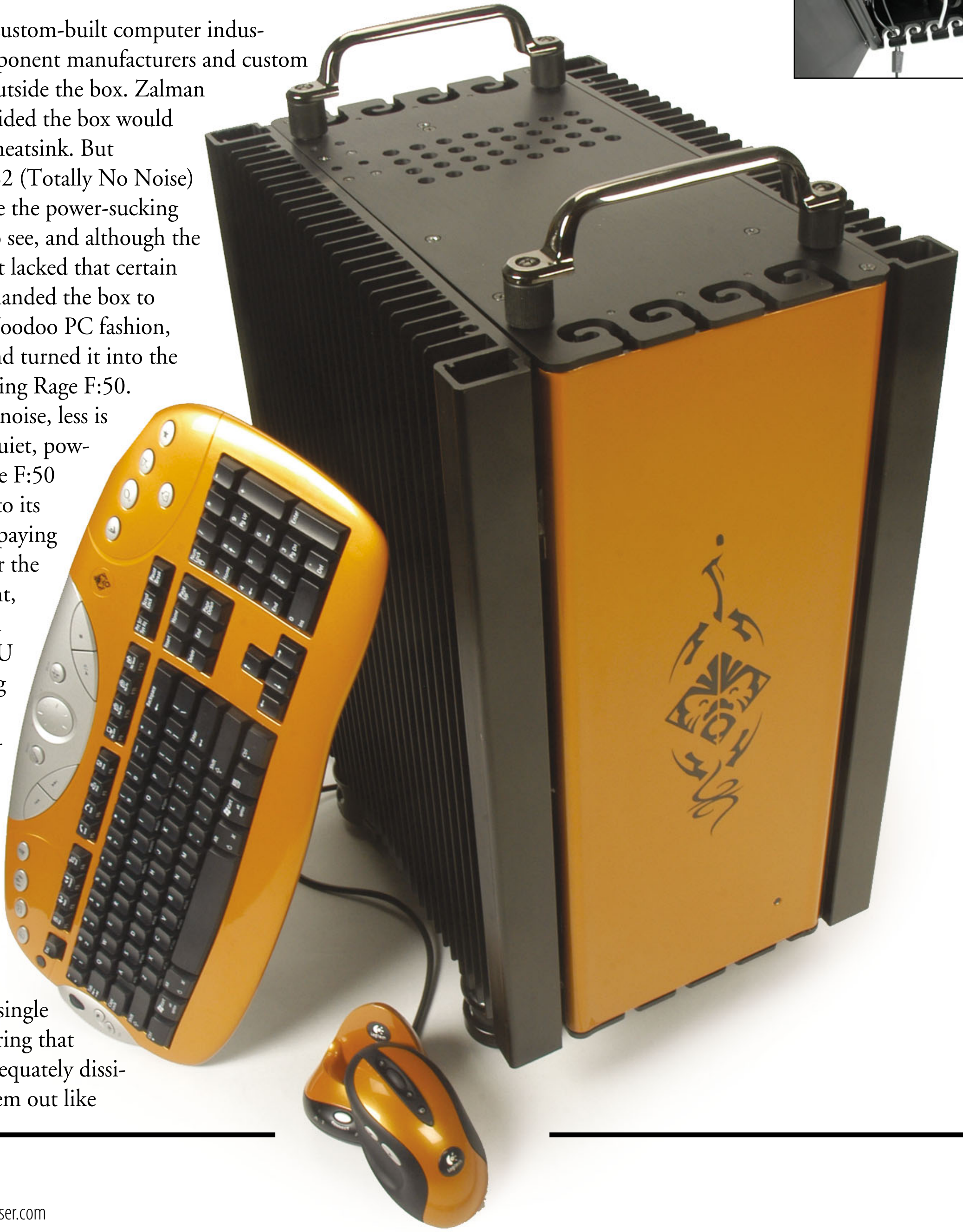
Dream Hardware

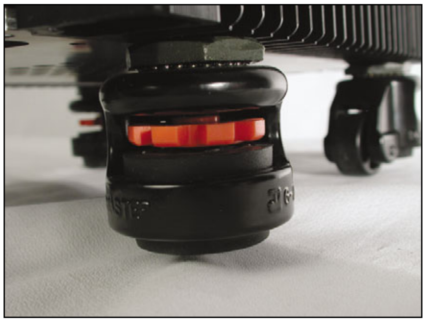


Voodoo PC Rage F:50

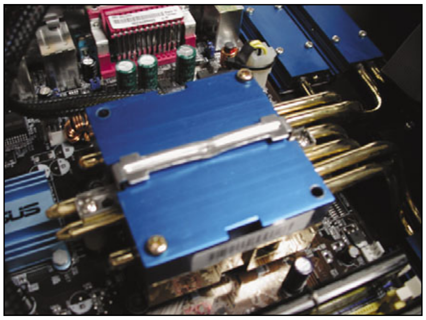
In the competitive custom-built computer industry, we expect component manufacturers and custom builders to think outside the box. Zalman thought about it and decided the box would probably make a decent heatsink. But Zalman's TNN500A-HS2 (Totally No Noise) enclosure couldn't handle the power-sucking components we expect to see, and although the case had plenty of style, it lacked that certain something. So, Zalman handed the box to Voodoo, which in true Voodoo PC fashion, promptly took it apart and turned it into the stylish, benchmark-crushing Rage F:50.

When it comes to PC noise, less is more. We'd settle for a quiet, powerful system, but the Rage F:50 borders on silent thanks to its fanless design. (If you're paying attention, you might hear the optical drive.) That's right, goodbye aircooling. Even the graphics card and PSU lack fans. Instead of using traditional aircooling or even a more exotic watercooling system, Zalman's enclosure dissipates the system's heat via two huge finned panels. Rahul Sood, Voodoo president and CTO, points out that Zalman uses a special machine to create each panel from a single piece of aluminum, ensuring that the 7mm-thick panels adequately dissipate heat. "[It] shoots them out like

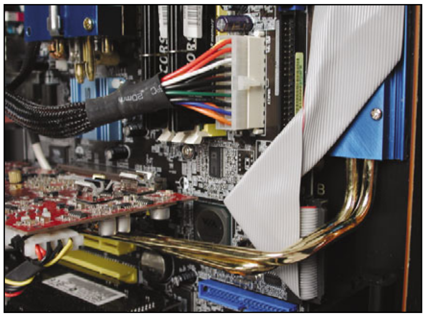




Casters. At 65 pounds, the Rage F:50 is no lightweight, but thanks to these casters (which support up to 4 tons), you won't need to haul it around.



CPU. Voodoo stacked a copper heatsink and aluminum cooling block on the Rage F:50's AMD Athlon 64 3400+. The copper heatpipes transfer the heat to case panels.

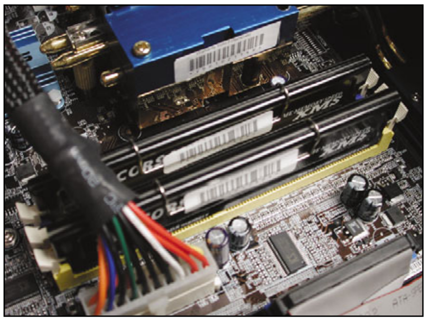


VPU cooling. As with the CPU's heatpipes, these liquid-filled copper tubes force heat away from the graphics card's core chip and toward the case itself.

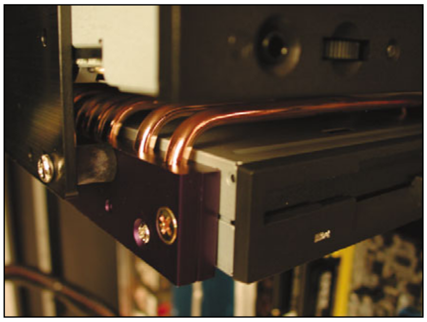
spaghetti. It's a huge machine." We had a hard time imagining anything tossing around these aluminum blocks. Thanks in no small part to its panels, the system weighs about 65 pounds. That's not exactly optimal LAN party weight, but then Voodoo and Zalman intended to create a jaw-dropper, not a carry-on.

The case is only half of the $5,000 Rage F:50's cooling system. To draw the heat from the components to the case, Voodoo attached Zalman's heatpipe system. Voodoo placed Zalman's aluminum heatsink blocks on each of the components and on the side of the case and then used several liquid-filled, copper heatpipes to link the heatsink blocks. Most of the heatsink blocks connect directly to their respective heat sources, with only Voodoo's secret thermal sauce in between. The CPU's heatsink block attaches to a massive copper heatsink. The liquid cycles the heat to the case's panels. Thanks to the natural convection process, the entire cooling system is absolutely silent and doesn't require an outside power source.

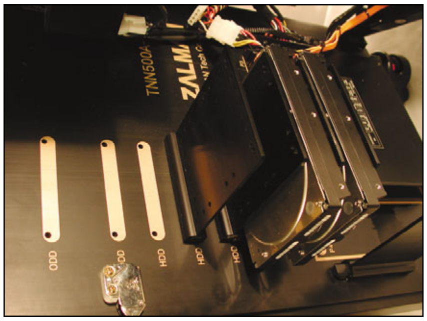
Because graphics cards or hard drives have different heat requirements, Voodoo and Zalman worked together to determine the appropriate heatpipe sizes for specific components. Our system includes an AMD Athlon 64 3400+ processor, one of the fastest processors that the Rage F:50 supports. The system also supports standard Intel P4 processors, but the cooling system can't yet handle Intel Extreme Edition processors or AMD Athlon FX series processors.



Memory. Voodoo added 1GB of Corsair TwinX 3200LL DDR memory. Yum.



Drive mount. Voodoo placed a floppy drive in our system's mount, but it often uses the bay to simultaneously cool and quiet the hard drive.



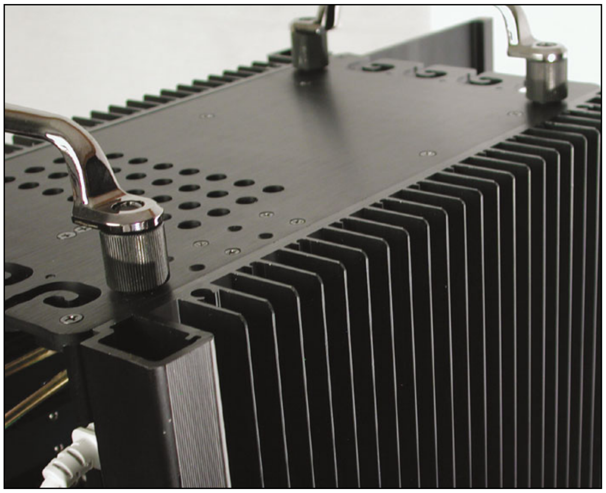
Drive mounts. These panel mounts pull heat directly from the drives into the heatsink case.

That said, Voodoo isn't ignoring top-tier processors. "We're working on a new version [of the silent Rage series] that we're going to release very soon that will allow us to do faster processors," Sood says. "We're working aggressively with NVIDIA because we feel that the 6800 is currently the best choice for a video card, and we will have 6800s running in it, as well."

The heatpipes also extend to the graphics card's VPU and the hard drive mount that sits below the system's two optical drive bays. As with Voodoo's Rage F:1, users can remove the Rage F:50's 256MB ATI Radeon 9800XT graphics card when they want to upgrade to a new card. Our card's memory has standard heatsinks instead of the heatsink blocks and heatpipes, but Voodoo can add additional heatsink blocks and heatpipes to cards that require better cooling.

When users order a single hard drive configuration, Voodoo places the drive in the hard drive mount under the optical drive bays. Heatsink blocks on either side of the mount cool the drive and reduce drive noise. Heatpipes span the two blocks and pass the heat along to the side panel. Our system's hard drive mount houses the floppy because Voodoo attached the dual hard drives to the side panel. The side panel mounts don't require cooling blocks because they pass the heat directly to the case.

Although Voodoo won't put the AMD Athlon FX series processors in the Rage F:50, it managed to load several other high-end components into its massive



The Rage F:50's aluminum case doubles as its heatsink, which means it doesn't need fans. Note the heat-dissipating fins.

case. In fact, the case's 300W PSU couldn't handle the Rage F:50's power-sucking innards, so Voodoo modified the PSU, increasing its output. The system includes two 120GB 7,200rpm hard drives in RAID 0 configuration, a Plextor PlexWriter Premium CD-RW, and the popular Plextor PX708A DVD±RW/CD-RW combo. The motherboard, an ASUS K8V Deluxe that boasts VIA's K8T800 chipset, sports two 512MB Corsair TwinX 3200LL DDR DIMMS.

The Rage F:50 performed well when we took it for spin, posting a solid 6591 in 3DMark03 and a 4413 PCMark04 System Score. FPS gamers who (virtually) live or die by hearing or missing opponents' footsteps will love this PC, but so will a host of nongamers who don't want to sacrifice power for silence.

by Joshua Gulick

Rage F:50
$5,000
Voodoo PC
(888) 708-6636
(403) 264-4530
www.voodoopc.com

All The Rage Of Voodoo's F:50	
Case	Zalman TNN500A-HS2
Power Supply	300W Voodoo modified
Motherboard	ASUS K8V Deluxe
Chipset	VIA K8T800
CPU	2.2GHz AMD Athlon 64 3400+
Heatsink/Fan Unit	Custom
RAM	1GB Corsair TwinX 3200LL (512MB x 2)
Hard Drive	(2X) 120GB Hitachi 7,200rpm SATA (RAID 0)
CD-RW	Plextor PlexWriter Premium 52X/32X/52X CD-RW
DVD±RW	Plextor PX708A 8X DVD+R, 4X DVD-R, 4X DVD+RW, 2X DVD-RW, 12X DVD-ROM, 40X/24X/40X CD-RW
NIC/Modem	Integrated LAN
Video Card	256MB ATI Radeon 9800XT
Sound Card	Creative Labs Sound Blaster Audigy 2 ZS
Keyboard	Logitech Cordless MX Duo
Mouse	Logitech MX700
OS	Windows XP Pro
Price	$5,000
Extras	T-shirt, Voodoo Attack-Pad, Allure finish
PCMark04 System	4413
3DMark2001SE	20860
3DMark03	6591
AquaMark03	46452
Quake III	
800 x 600	343.7
1,024 x 768	341.5
1,280 x 1,024	316.15
Halo	
800 x 600	49.35
1,024 x 768	47.13
1,280 x 1,024	38.48

Artwork. Like the orange Allure finish? Voodoo also puts this option on speakers and monitors.

Super wireless performance– it runs in our family.

Faster access to multi-player gaming
Video streaming without jitters
Effortless wireless connection – gets anyone up and surfing quickly
Superior wireless range

Total 802.11 Super G™ ATHEROS

Super G™ Technology – 10X Faster

108 Mbps 2.4 GHz 802.11 g

WGT624
108 Mbps
Firewall Router

WG511T
108 Mbps
PC Card

WAG511
108 Mbps
Dual Band
PC Card

WAG311
108 Mbps
Dual Band
PCI Adapter

Introduce your family to our NETGEAR® 802.11g family that offers exceptional range, compatibility, security and super speed.

Now you can choose 802.11g technology with confidence, thanks to NETGEAR. Recipient of two CNET awards for exceptional performance and ease of use, our 802.11g family runs circles around other companies' wireless networking products. It's fully compliant with the recently ratified 802.11g standard and compatible with all 802.11b and 802.11g products.

Our NETGEAR 802.11g family. The perfect addition to *your* family. For details, stop by for a visit at **www.netgear.com/go/g**.

54 Mbps 2.4 GHz 802.11 g

cnet Editors' Choice APR 2003

WG602
54 Mbps
Access Point

cnet Editors' Choice APR 2003

WG511
54 Mbps
PC Card

WG311
54 Mbps
PCI Adapter

WGR614
54 Mbps
Router

WGE101
54 Mbps
Ethernet Bridge

WG121
54 Mbps
USB Adapter

Everybody's connecting.™

NETGEAR®

©2003 NETGEAR, Inc. NETGEAR is a registered trademark and "Everybody's connecting." is a trademark of NETGEAR, Inc. All rights reserved. Other brands and products are trademarks of their respective holder/s. E134 Smart Computing

Advanced Q&A Corner

Get informed answers to your advanced technical questions from *CPU*. Send your questions along with a phone and/or fax number, so we can call you if necessary, to q&a@cpumag.com. Please include all pertinent system information.

Each month we dig deep into the mailbag here at CPU *in an effort to answer your most pressing technical questions. Want some advice on your next purchase or upgrade? Have a ghost in your machine? Are BSODs making your life miserable?* CPU*'s "Advanced Q&A Corner" is here for you.*

Mark Annotto asked: I'm about to purchase an ATI Radeon 9800 XT for my Dell XPS. Right now I have a 17-inch CRT monitor, but due to a recent foray into video editing with Adobe Premiere Pro, I really want to add an additional monitor. I have some questions, though, and if you can answer them, I'd be forever indebted.

First off, will the 9800 XT support both a CRT monitor and a flat-panel LCD monitor at the same time? If it does, would you recommend editing the video on the CRT and having the controls and timeline tools on the LCD or vice versa? (I've heard rumors that LCDs distort video at times, and therefore video editing is best done on CRTs.) And which LCD monitors would you recommend and why?

A: With regard to your first question, yes, you will be able to use a CRT and an LCD at the same time with an ATI Radeon 9800 XT. The 9800 XT has the ability to power dual independent displays simultaneously, using any combination of two outputs on the back of the card (DB15, DVI, and TV-Out).

To answer your second question, an LCD won't "distort" the video, but if the model you purchase has a slow pixel response time, you may see some ghosting on the screen during scenes with fast-moving objects. What you should look for is an LCD with the fastest pixel response time and highest contrast ratio that will fit within your budget. The LCD's pixel response time dictates how quickly (or slowly) each pixel on the screen will react to changes in brightness or color. The slower the response time, the longer it takes for each pixel to change with the scene, which results in ghosting when an object is moving quickly on-screen. The LCD's contrast ratio determines how well it can display slight variations in different shades of the same color. The higher the contrast ratio, the better the screen will be able to display minor color differences. How-ever, if you've got a high-end CRT and end up buying a high-end LCD, your method of video editing may come down to a matter of preference. After you take the plunge and buy an LCD, we'd recommend trying the setup both ways before making up your mind. Generally speaking, though, having the video playing on the CRT and the editing controls on the LCD is probably the safer bet. Which brings us to your last question . . .

Dell's UltraSharp 2001FP was one of the first commercially available LCD flat panels to ship with the 16ms pixel response time.

The Samsung SyncMaster 213T has a super-fast 16ms pixel response time and a 500:1 contrast ratio.

Currently, we really like the 20-inch Dell UltraSharp 2001FP and the 21-inch Samsung SyncMaster 213T. At 16ms, these LCDs have the fastest pixel response times available as of press time and have great contrast ratios to boot (400:1 or better), but they are also a couple of the most expensive models on the market today. If the 2001FP and 213T exceed your budget, any of the smaller LCDs in Samsung's or ViewSonic's lineups should also serve you well. Just make sure you look for 16ms or lower response times and 400:1 or higher contrast ratios.

Dex asked: I've just recently completed a RAID 1 setup with two Western Digital SATA 80GB hard drives. After I created the RAID array and loaded the drivers and OS (WinXP), I didn't receive any errors; everything went through without a glitch. However, both drives are displayed in the BIOS but only as an 80GB drive instead of 160GB combined. Is this normal for both to display as 80GB total with "mirroring/raid1" setup? Here's my system configuration:

ASUS A7N8X-E Deluxe motherboard (using onboard RAID controller)
AMD 3200+ processor

A: Your system seems to be reporting the drive array size properly for the configuration you mention here, Dex. A RAID 1 array or "mirroring" RAID array creates a mirror image of the boot drive on the secondary drive. As data is changed on the boot drive, a "mirror" image of the data is created on the secondary drive on the fly. RAID 1 arrays are defined for redundancy and security of your data. If one drive goes down, the other drive in the array will take over, and there is no loss of data. The reason your array size is showing 80GB is because a RAID 1 array is only as large as the smallest drive in the array. Since you have two matched 80GB drives here, the max array size is 80GB.

What you may have been thinking of, when you expected to see a 160GB drive array size in your OS, was a "RAID 0" array or "striping" mode. RAID 0 is designed for performance and maximization of array size. In actuality, this mode should really be called "AID" because it involves no redundancy at all. (RAID stands for Redundant Array of Inexpensive Disks.) In this mode your drives combine into one large array and data is "striped" across them. Two 80GB drives in a RAID 0 configuration will be shown as a 160GB drive in any supported OS such as Windows XP. Additionally, a RAID 0 array is much faster than a single drive on its own. The drives work together in parallel, which increases throughput because all disks in a stripe set work together on read or write operations. For best performance, all drives in a RAID 0 array should be the same size.

The downside of a RAID 0 array is that if one drive in the array goes down, all your data is lost. However, because the average PC today only has a single drive in it anyway, you're not assuming much more risk by running a RAID 0 setup, and the performance and capacity gains are well worth it. Conversely, as a matter of course, it's always advisable to back up your data on a regular basis because your odds of drive failure are higher with two drives in the array. Many of us at HotHardware.com have been running RAID 0 arrays for years without issue.

Bater296 asked: I built a machine three weeks ago with an Axio case that came with a 400-watt power supply. It ran fine for the first three weeks. I usually leave it on around the clock. I woke up one morning, and the machine was off. I tried to turn it on but got nothing, no power at all. I ended up opening the power supply and saw that the fuse inside was blown. What causes that to happen in a short period of time like that?

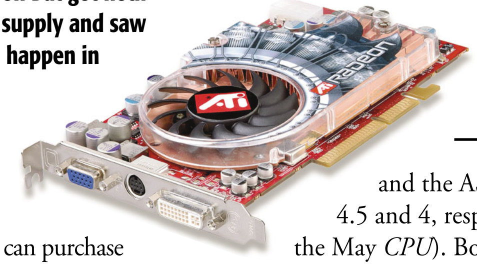
A: Unfortunately, Bater my friend, this may be a simple case of low-cost components equals poor reliability. Doing a quick scan on the 'Net turns up Axio power supplies in the 400-watt range that you can purchase for as little as $15 and cases that include the power supply as cheap as $35 or so. You simply can't build a decent PC case and 400-watt power supply for that kind of money without seriously cutting corners somewhere. If you're paying $35, then actual cost is probably somewhere around $20. You probably were the unlikely victim of a power surge. Sudden fluctuations in AC power over residential lines are very common. An adequately designed PC power supply's internal line conditioning circuit will absorb the momentary spike or dip in power without a hiccup. Other lower-quality units will exhibit various anomalies.

You probably suffered a spike of some sort, which instead of dissipating in the line conditioning array inside the power supply, toasted that fuse to avoid frying your motherboard. The good news is that you most likely didn't burn up anything else because that fuse blew as it was designed to. Our suggestion would be to replace that power supply with a better-built unit from the likes of Antec, Enermax, Sparkle, or Fortron/Source. We would even go so far as to recommend PC Power & Cooling power supplies, but they are top-shelf, and your setup, we would guess, is more of a budget approach. You could just replace that fuse in the Axio supply, but if a surge ever gets past that fuse and down into your motherboard, things could get considerably more expensive. If you are happy with the Axio case, get a better power supply. You'll be glad you did.

Logan Batiuk asked: I currently own an outdated Celeron-based system but am planning to build an entirely new rig from scratch. Which processor offers the best "bang for the buck," an Athlon XP or Athlon 64? And would you recommend an ATI Radeon 9800 Pro 128MB or should I go with a 9600 or 9700 and spend the leftover cash elsewhere? Also, I want 1.5GB of RAM (512MB x 3), plenty of overclocking options, and the best motherboard chipset available. Lastly, I have some cooling questions, as well. Should I go with a high-end, air-cooled system or try watercooling?

A: We're going to have to cover quite a few different topics for you here, Logan! We're of the opinion that the Athlon 64 is a better buy than the Athlon XP, not because its price-to-performance ratio is much better but because it is a newer, more capable architecture that is significantly faster than the Athlon XP in most real-world situations, clock-for-clock. The Athlon 64 2800+ ($173), for example, will outperform the Athlon XP 3200+ ($178) in most instances, and the Athlon 64 2800+ should overclock much higher than the 3200+, relative to their default clock speeds. Move up to faster Athlon 64s, and their performance advantages only get bigger—plus they can run native 64-bit code when using the proper OS.

Our motherboards of choice are both based on VIA's K8T800 chipset: the ABIT KV8-MAX3 and the ASUS K8V Deluxe (*CPU* ratings of 4.5 and 4, respectively, in our reviews on page 21 of the May *CPU*). Both boards are feature-rich, have three DIMM slots to satisfy your 1.5GB requirement, and offer a myriad of overclocking tools. We recommend you stick with high-end aircooling for now. Watercooling is great, but the extra cost and the risks involved aren't necessary unless you absolutely want to overclock the system to its limit.


The ATI Radeon 9800 XT is a great card for gaming, and it can power dual independent displays simultaneously.

Choosing the video card is a bit more difficult. If you're only a casual gamer, save the dough and pick up a Radeon 9600 XT (or the 9700 Pro if you can find one); it's a very capable card and has excellent image quality. If gaming is high on your priority list, however, definitely go with the Radeon 9800 Pro. There are only $40 to $50 separating the two at the moment, which is money well spent when you compare their relative performance. The Radeon 9600 XT simply isn't in the same league. ▲

by Dave Altavilla and Marco Chiappetta,
the experts over at HotHardware.com

For more answers to your questions, subscribers can see www.cpumag.com/cpujul04/q&a.

WiMAX

Broadband By Air

Consumers are being asked to pick sides in what's becoming an interesting battle in big business: wired vs. wireless. In the near future, you may have the choice of subscribing to your broadband Internet connection through an Internet cable or DSL line or through a high-speed wireless connection. Businesses will be watching closely as users make their choices in what some analysts say could become a $3 billion annual business.

Inside WiMAX

WiMAX (Worldwide Interoperability for Microwave Access; used interchangeably with IEEE 802.16) can deliver extremely high data transmission speeds, matching those of DSL, Internet cable, or even a T1 line, depending on what the customer wants. Because it's a wireless technology, WiMAX can easily reach remote locations with minimal installation costs.

The WiMAX Forum consists of dozens of companies that are developing BWA (broadband wireless access). The Forum is working at building support for the standard to let manufacturers make pieces of equipment that are cost-effective and will easily work together. The 802.16 standard involves several key components.

PMP architecture. PMP (point-to-multipoint) is at the heart of the 802.16 standard. In a PMP architecture, the network signal originates from a single point and serves several users at once. Using PMP also gives WiMAX capabilities that are loosely similar to a cell phone network in which hundreds of customers using the network are connected to the same tower.

PHY layer. The 802.16 standard deals specifically with the PHY (physical) layer of the wireless network. In developing the standard, the IEEE's task group decided to provide high-capacity links (10GHz to 66GHz) when line of sight is available between the origination and destination points. When line of sight isn't available, the standard allows for low-capacity links

802.16 vs. 802.11

The 802.16 wireless standard will be backward compatible with 802.11, and the two standards should work together well despite the fact that they offer vastly different features.

Other Names

802.16. WiMAX; Air Interface for Fixed Broadband Wireless Access Systems; IEEE wireless MAN (metropolitan area network) Air Interface

802.11. Wi-Fi; Wi-Fi5; Wireless LAN

Range

802.16. Up to 30 miles; best for large antennae and long-range, outdoor performance; designed to handle many users spread out over several miles

802.11. About 300 feet indoors or about 1,000 feet outdoors; best for short-range, indoor performance

Security

802.16. Uses 128-bit Triple-DES (Data Encryption Standard) and 1,024-bit RSA encryption

802.11. The 802.11i standard is addressing additional security needs; currently the standard is WPA (Wi-Fi Protected Access) and WEP (Wired Equivalent Privacy)

Scalability

802.16. Can support anywhere from one to hundreds of pieces of CPE (Customer Premise Equipment), and you can have unlimited subscribers within each CPE

802.11. Limited to one subscriber per CPE device, and it's more intended for LAN applications

Data Rate

802.16. The maximum data transfer rate is 280Mbps per base station (or large antenna); 802.16a can support a 70Mbps shared data rate.

802.11. Using Wi-Fi, the maximum data transfer rate is 11Mbps, although most devices only achieve half that speed because of interference and signal deterioration over distance. Wi-Fi5's maximum data transfer rate is 54Mbps, although signal degradation starts occurring at 25 feet.

Different Flavors

802.16. Five additional standards are currently available or are planned under the 802.16 umbrella.

802.16a supports the 2GHz to 11GHz frequencies without the need for line-of-sight transmission.

802.16b emphasizes protocols that guarantee a high quality of service.

802.16c deals with protocols and with test-suite structures.

802.16d makes additions to the 802.11c standard, which deals with developing access points.

802.16e will provide support for mobile broadband.

802.11. The three additional standards listed here have gained the most notoriety under the 802.11 umbrella, but several others exist, too.

802.11a is usually called Wi-Fi5 and has a faster data transfer speed than the Wi-Fi standard. It uses the 5GHz band with a maximum speed of 54Mbps.

802.11b is interchangeable with the name Wi-Fi and works in the 2.4GHz band with a maximum speed of 11Mbps.

802.11g is designed to bring Wi-Fi5's 54Mbps data transmission speed onto the 2.4GHz band used by Wi-Fi. ▲

Subscribers can see our "Watching 802.16 Grow" timeline at www.cpumag.com/cpujul04/wimax.

(2GHz to 11GHz). Having two capacities enhances signal reliability, which was a key consideration of the IEEE. The PHY layer is an area where 802.16 has an advantage over 802.11 because of its ability to tolerate a significantly higher multipath delay spread (the time difference between the arrival of the first and last signal to the receiver).

MAC layer. The IEEE created the MAC (Media Access Control) layer of the 802.16 standard specifically to serve broadband wireless and handle long-range wireless capabilities. The MAC layer can work with any type of transport protocol, such as Ethernet, ATM (Asynchronous Transfer Mode), or IP. The MAC layer is flexible enough to support future protocols, too.

10GHz to 66GHz. Within this high-capacity frequency band, the standard will have two MAC system profiles and two PHY system profiles. The MAC profiles will include support for a basic ATM system and a basic IP system. The two PHY profiles will include a 25MHz-wide channel (mainly for use in the United States) and a 28MHz-wide channel (for use in Europe).

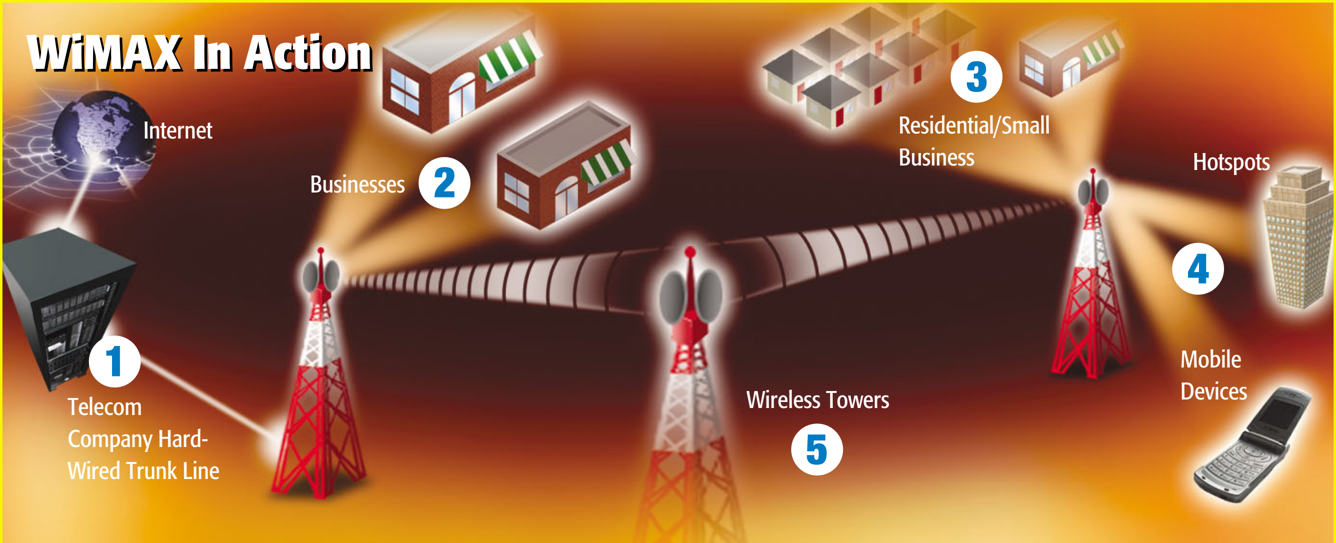
2GHz to 11GHz. In its low-capacity frequency band, WiMAX will build backward compatibility to other wireless networking standards. The 802.16a standard applies to the 2GHz to 11GHz band.

The Hope For WiMAX

Those working on WiMAX products (which should begin appearing in the next several months) hope to make them easy to use, sparking people to set up wireless networks in homes and offices and to move one step closer to a wireless world.

by Kyle Schurman

WiMAX In Action


Internet
Businesses
2
3
Residential/Small Business
Hotspots
4
1
Telecom Company Hard-Wired Trunk Line
Wireless Towers
5
Mobile Devices

1 The WiMAX towers connect to the Internet by traditional wired means: a high-speed trunk line. This fixed wireless concept consists of connecting a backbone of wireless towers (also called base stations) to a fixed public network. Each tower can support hundreds of customers.

2 Because the companies that provide wired Internet access often have a backlog of work, it can take several weeks for both large- and small-business customers to receive high-speed Internet service. WiMAX could provide the speed and data capacities that such businesses need by using a line-of-sight connection to the business with a faster setup than is possible through wired connections. By adding temporary 802.11 hotspots inside the building, the customer can gain additional Internet access capacity through its WiMAX connection for special events.

3 WiMAX is a cost-effective alternative to solving the last-mile problem that has kept many home users and businesses from gaining access to broadband. It's extremely expensive for companies that provide wired Internet service equipment to upgrade the lines that connect the end customer with the provider's high-capacity trunk to the Internet. The wires connecting the customer to the trunk line are usually only capable of low-speed data transfers, hence the last-mile problem. No matter how fast the network is, the end customer network speed is limited by the limitations of the final section of wire. WiMAX would give these customers a wireless broadband connection, and it would cost far less to employ than a wired broadband connection.

4 Because of WiMAX's compatibility with 802.11, an 802.11 hotspot can make a connection to an 802.16 tower, gaining broadband access to the Internet. This capability means users with mobile devices, such as cell phones or notebooks, could connect to an 802.16 tower through an 802.11 hotspot, even when they leave their home or business, and still have Internet access through a WISP (wireless Internet service provider).

5 Wireless backhaul (the process of getting data to the network backbone) may become a more cost-effective alternative to wired backhaul for many Internet and cellular service providers. Because WiMAX will have a large amount of available bandwidth, it will work well for giving third parties an alternative to wired access to network backbones.

Source: Intel, WiMAX Forum

Graphics & Design: Carrie Benes & Jason Codr

ATI X800 Series

The R420 Brings New Technologies

Ruby's in-depth 3D modeling showcases the capabilities of ATI's new VPU, the Radeon X800. You can view the story ATI created around the Ruby character at www.ati.com/ruby/index.html.

When it comes to VPUs and graphics boards, people seem to have their own preferences for what technological improvements they'd like to see. Consumers want high detail and great image quality with no performance problems. Computer makers (and consumers) don't want VPUs that run hot and require several noisy, power-gobbling cooling fans. Game developers love being able to highlight all kinds of new hardware technologies in their games, but they want the technologies to be easy to implement.

ATI hopes it has hit the sweet spot in meeting the needs of these diverse groups with its Radeon X800 series of chips and boards. The X800 (code-named R420 during development) began appearing in products in May and will fuel several different products from ATI.

The X800 Series

The R420 chip has 160 million transistors and is initially appearing as the Radeon X800 VPU in two graphics cards from ATI. The Radeon X800 Pro ($399) features 128MB of GDDR3 memory and a VPU engine clock speed of 475MHz. The Radeon X800 XT Platinum Edition ($499) has a clock speed of 510MHz and 256MB of GDDR3 memory. For a full review of these cards, see page 20. Future versions of the X800 Pro and X800 XT will probably feature 512MB or 1GB of GDDR3 memory.

Both of the initial X800 series cards from ATI use the AGP 8X display interface. ATI was scheduled to introduce another new card (the Radeon X880 XT) in June that featured a PCI Express x16 display interface. The X880 XT (based on a VPU that was code-named R423 during the development phase) should be similar to the X800 XT in its feature list and should cost $499. ATI also may introduce a low-end graphics card, the X800 SE ($299), which would use the R420 chip and 128MB of DDR SDRAM as its graphics memory. Most analysts expected to see the X800 SE in June, but ATI officials say the company hadn't yet finalized its decision on when or if to release the X800 SE at the time of this writing.

The X800 will not include full support for pixel shader 3.0 and vertex shader 3.0, both of which are components of DirectX 9.x. David Nalasco, ATI's technical marketing manager, says the X800 series supports an extended version of the shaders, called shader 2.0b. X800 supports some, but not all, of the features of shader 3.0, so ATI cannot claim full support. ATI selected the shader 3.0 features that would provide the most benefits for inclusion in the X800, Nalasco says.

Analysts say it's possible that ATI will incorporate full support for the shader 3.0 versions once Microsoft releases its Longhorn OS (the next generation of Windows), which may appear in 2005.

Featuring GDDR3

ATI's incorporation of GDDR3 memory into the X800 series brings the latest improvements in memory technology to the company's graphics boards. (See page 34 of the June 2003 *CPU* for a detailed look at GDDR3.) ATI was involved with several other companies in the development of GDDR3, and the group designed it to carry over the strengths of DRAM into graphics memory. Nalasco says the presence of GDDR3 in the X800 series is important because it uses less power than other types of memory while running at higher clock speeds. GDDR3 also lowers the overall cost of manufacturing the graphics boards.

ATI is working extensively on the next generation of graphics memory, GDDR4, with other companies through JEDEC. GDDR4 should

X800 Performance Specs

Source: ATI

The Radeon X800 series of GPUs and graphics boards will provide significant performance improvements over what was available with ATI's Radeon 9800 series.

	Radeon 9800 Pro	Radeon 9800 XT	Radeon X800 Pro	Radeon X800 XT
Transistors	110 million	110 million	160 million	160 million
Clock Speed, Engine	380MHz	412MHz	475MHz	510MHz
Clock Speed, Memory	680MHz	730MHz	900MHz	1.12GHz
Memory Bandwidth	21.8GBps	23.4GBps	28.8GBps	32GBps
Vertex Pipelines	4	4	6	6
Pixel Pipelines	8	8	12	16
Transform Rate (vertices/second)	380 million	412 million	712 million	750 million
Pixel Fill Rate (gigapixels/second)	3	3.3	5.7	8
Antialiased Fill Rate (samples/second)	18.2 billion	19.8 billion	34.2 billion	48 billion
Shader Performance (instructions/second)	16 billion	17.3 billion	34.2 billion	46 billion

operate at a clock speed of at least 1.4GHz, and the standardization process should be finished some time in 2004.

HD Gaming

ATI has enhanced some of its technologies to emphasize HD gaming in the X800 series, hoping to bring the quality of HDTV onto the gaming platform by creating smooth frame rates with high resolutions while enhancing detail and quality.

SmartShader HD. This technology greatly increases pixel shader performance in the X800. With its 16 pixel shader pipelines, the new ATI VPU can handle more than 40 billion pixel shader operations per second, about two and a half times more than what was available previously.

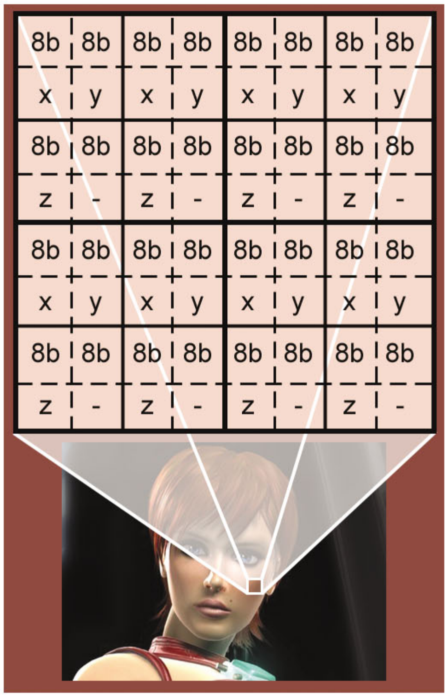
SmartShader HD also provides improved vertex shader performance in the X800. The X800 can execute more than 700 million vertex shader operations per second, about double what was available previously.

SmoothVision HD. ATI's SmoothVision HD technology specifically deals with antialiasing modes. The X800 should further minimize the performance hit that running antialiasing sometimes causes. With SmoothVision HD, the X800 uses a multisample algorithm of two, four, or six samples per pixel. Using temporal antialiasing, the X800 will alternate the sample patterns from frame to frame, effectively doubling the effectiveness of the antialiasing while causing no additional performance problems. However, to gain the most value from this type of antialiasing, the user's frame rate should meet or exceed the refresh rate of the user's display unit. "We now say you should never have to turn off antialiasing, even when running the newest games," Nalasco says.

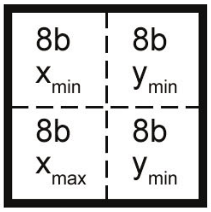
Hyper Z HD. This technology involves the rendering of a 3D image using the Z-buffer (or depth buffer), which measures the distance from each object to the viewpoint. The Z-buffer also stores information about which objects will be drawn in front of other objects, saving bandwidth by not rendering unseen background objects. However, the Z-buffer still requires a lot of memory bandwidth to operate properly. Hyper Z HD attempts to alleviate any memory bottlenecks by improving compression ratios and clearing the data in the Z-buffer more efficiently.

3Dc Puts On The Squeeze

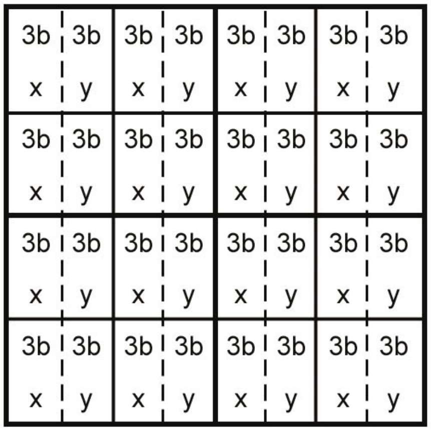
To create a 3D image in a game, a developer uses a series of triangles. To add the appearance of detail to the 3D images, the developers wrap 2D textures around the triangles. However, the 2D textures don't always accurately reflect light, giving the images a flat appearance. ATI's 3Dc technology uses compression to provide additional texture detail without causing memory and bandwidth problems.



3Dc works on a 4 x 4 block of integer data, as shown above. Each element within the block contains 8-bit channels (marked with 8b) for the x, y, and z coordinates. (The alpha channel, marked with a hyphen [-], goes unused.) The entire 4 x 4 block occupies 512 bits.



To compress the block, 3Dc begins by discarding the z coordinate value because the pixel shader can recalculate the z coordinate from the x and y coordinate values later. The unused alpha channel is discarded, too. Within the overall block, 3Dc then determines the maximum and minimum values for x and y (as shown above) and maintains 8-bit channels for them (a total of 32 bits).



Finally, 3Dc calculates six representative values between the minimum and maximum of x and y. It then applies one of those six values to each x and y channel that most closely matches the original value in the channel. This process reduces each remaining channel to 3 bits for a total of 96 bits. When added to the 32 bits in the maximum and minimum value channels, you have a total of 128 bits in the compressed block for a 4:1 compression ratio.

3Dc. Finally, 3Dc technology represents a new compression technique that greatly enhances image detail and overall VPU performance while minimizing memory usage. 3Dc specifically works well with normal maps, another key component of the X800 (more on 3Dc later).

Supporting Normal Maps

A normal map helps calculate how a light source reflects off any surface, with detail down to an individual pixel. The use of normal maps has been common in many movies containing rendered characters, such as "Lord of the Rings." Normal maps are also beginning to appear in games; ATI expects the technology to become commonplace for games by the end of 2004.

Normal map technology measures the angle of each pixel on the surface as it relates to the light source. You can think of this process as if an arrow was extending perpendicularly outward from each pixel on the surface. A normal map can determine the exact direction that each pixel on the surface faces. The graphics processor uses the information stored in the normal map to determine how the light source will reflect off each point on the surface, which provides the illusion of 3D detail.

Developers could use a large number of polygons to achieve the same effect that the normal map provides, but normal maps require far less storage space and require less processing time than the large number of polygons would require.

Having said that, normal maps aren't exactly memory conservationists. When used on all surfaces, normal maps can occupy double the amount of space that comparable texture data requires. Older compression technologies, such as DXTC (DirectX Texture Compression), have yielded less-than-desired results when applied to normal maps, causing a noticeable loss of detail, especially in bright-light situations.

Enter ATI's new compression technology designed specifically with normal maps in mind: 3Dc.

Compressing With 3Dc

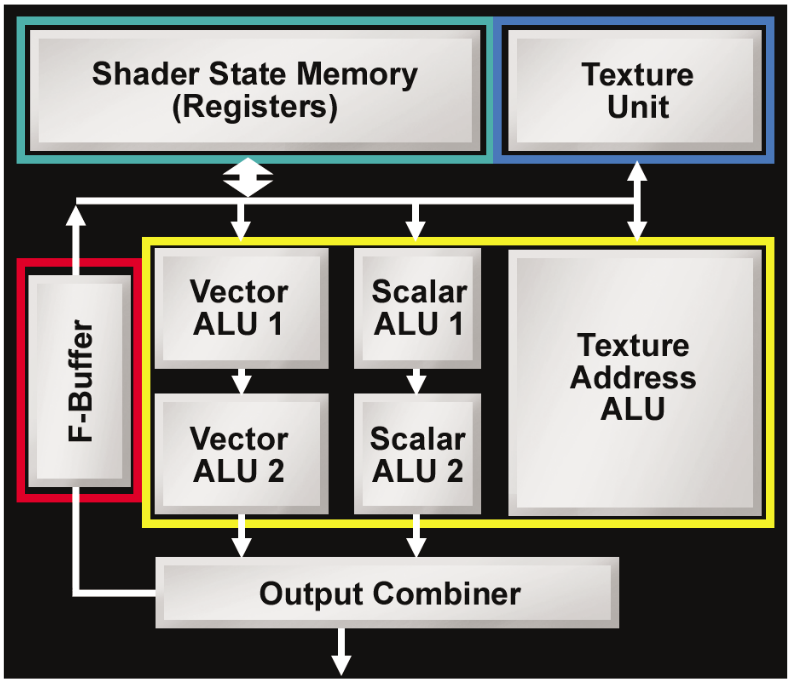
As the power of graphics cards increases, developers can add more detail to their images, especially when it comes to lighting and reflections. However, game developers still must find the correct balance between image detail and rendering performance.

Support for 3Dc through hardware acceleration in ATI's X800 series of boards should deliver vastly improved graphics detail without negatively affecting performance. ATI says 3Dc will bring widespread usage of high-resolution normal maps to games for the first time. Game players will notice fine details in 3D images they've rarely seen in the past. "3Dc is simple to implement, it looks fantastic, and it will separate the new generation of games from what we're used to," Nalasco says.

3Dc can achieve a 4:1 compression on a normal map without suffering a significant loss in image quality. ATI says support for 3Dc is easy for game developers to add into their games, as long as the games already support normal maps. 3Dc also is compatible with existing 3D rendering technologies and other image-enhancement technologies, such as antialiasing.

X800's Pixel Shader Improvements

ATI's SmartShader HD technology made significant improvements in the X800 series pixel shader.



SmartShader HD increases the number of temporary registers in the pixel shader from 12 to 32, giving the X800 VPU the ability to maintain its highest performance level.

The F-buffer under SmartShader HD has greatly improved its ability to manage memory. It also makes multipass shaders far more efficient by only processing the affected pixels during each pass, rather than processing the entire frame during each pass.

The Texture Unit handles the 3Dc compression method that the X800 VPU uses. 3Dc is designed specifically for normal maps and can achieve a 4:1 compression ratio.

The maximum shader instruction count in this area of the pixel shader increased from 160 to 1,536 through SmartShader HD technology. The technology allows for the use of up to 512 shader instructions in the vector, scalar, and texture areas.

Because 3Dc technology is hardware accelerated, only a few shader instructions are required to achieve the compression, which greatly minimizes any performance loss. 3Dc also works well for compressing several material attributes, such as transparency and roughness, into one texture.

One Cool Customer

Finally, ATI developed the X800 series while focusing on maintaining the power consumption measurements and operating temperatures of its previous VPUs. Many times, new CPUs and VPUs run much hotter and require much more power than their predecessors. However, Nalasco says ATI wanted to avoid increases in those areas to meet the desires of customers and to prepare for the future.

Nalasco says the X800 VPU's heatsink is slightly smaller than the heatsink for the company's previous VPU, despite the increase in processing power, which means the chip is generating less heat. Less heat means the cooling fan can run less often, which lessens the noise from the fan. Secondly, ATI knows large fans and heatsinks won't be practical when BTX form-factor and SFF computers begin appearing in the near future.

Although ATI may be readying its products for smaller computer cases in the future, there's nothing small about the X800 series of VPUs and boards . . . and that includes the feature list, the processing power, and the enjoyment of the gamers. CPU

---

by Kyle Schurman

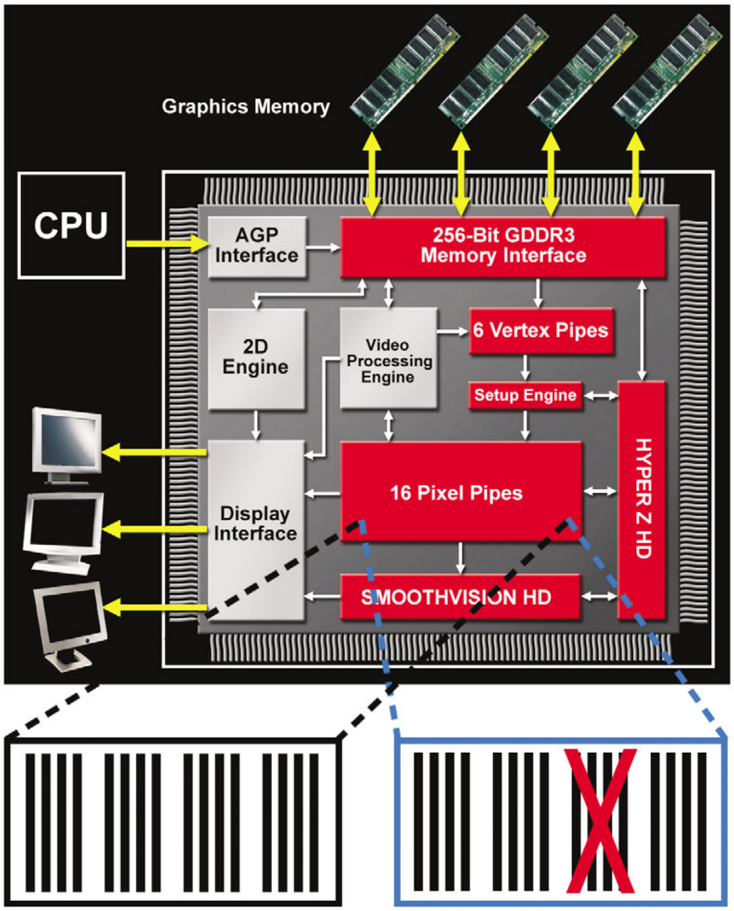
Subscribers can see more on normal maps at www.cpumag.com/cpujul04/x800.

Scalable Manufacturing With The X800

The TSMC (Taiwan Semiconductor Manufacturing Company) manufactures ATI's Radeon X800 GPUs using a 0.13-micron low-k copper fabrication process, which limits the degradation of signal quality within the GPU. ATI's previous GPU, the Radeon 9800, used a 0.15-micron aluminum fabrication process. By using copper instead of aluminum, the X800 GPU can transmit electrical signals much faster than the 9800.

The X800 manufacturing process allows for about 33% more transistors per unit area than appeared on the 9800, as well as an increase in clock speed of about 25%. However, the X800 doesn't require more power or generate more heat than the 9800.

When manufacturing its X800 GPUs, ATI employed a scalable design, which allows the company to generate far more useable dies from a silicon wafer. Because of inherent flaws in the silicon wafers, some areas of the die will be defective. By creating a scalable design, ATI no longer has to discard every die that has a flaw.



ATI's designers have divided the X800's 3D rendering core into four independent blocks that each contain four pixel pipelines (as shown at left). When the X800 renders a 3D scene, it divides the pixel processing workload among all four blocks.

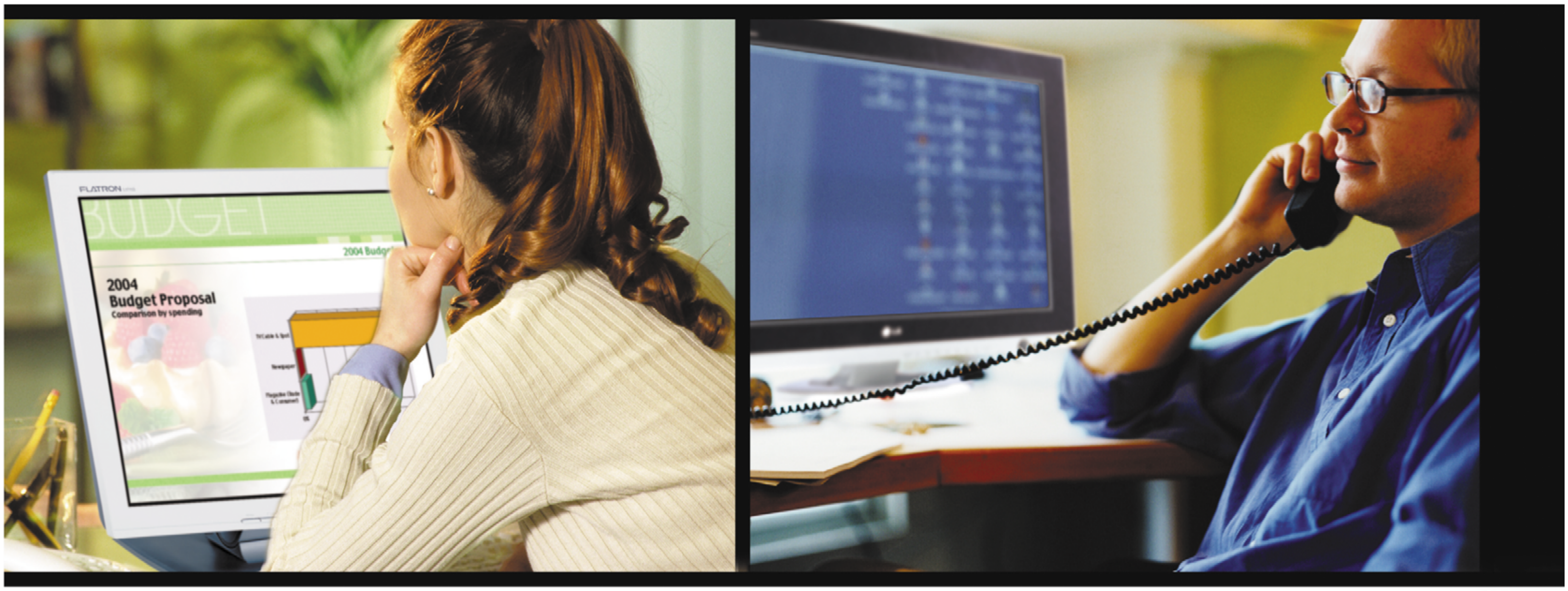
Because the 3D core occupies about 75% of the die, this portion of the die is the most likely area to have a defect. However, if the defect occurs in one of the pixel pipelines in the 3D rendering core, the manufacturer can disable the block that contains the defect, leaving the other three blocks—and the remainder of the chip—functioning correctly (as shown at near lower left; the red X shows the disabled, defective block).

ATI then can use the chip, now with 12 pixel pipelines, and will sell it at a lower price as a scaled-down version from its top-of-the-line, 16 pixel pipeline chips. (The image at the far lower left shows all 16 pipelines functioning.) For example, the Radeon X800 Pro uses 12 pixel pipelines, while the Radeon X800 XT Platinum uses 16 pixel pipelines.

"We can effectively recover a bunch of chips we'd otherwise have to throw away," Nalasco says.

Nalasco says ATI has had good fortune in the manufacturing process, achieving a higher-than-expected percentage of 16 pixel pipeline chips. Analysts expected ATI to release an 8 pixel pipeline chip—with two blocks disabled because of defects—at a later date, but Nalasco says the company hasn't yet finalized its plans one way or the other for that product.

LG FLATRON® LCDs.
Available in LG, XLG and XXLG.



©2004 LG Electronics U.S.A., Inc.

Available at:

BEST BUY
BestBuy.com

L2320A - 23″ Wide-Screen HD/WUXGA LCD Monitor

Because one size does not fit all.

With screen sizes from 15″ to 30″, offering features such as DVI and HD inputs or TV function, there's a perfect LG fit for every home or office. LG LCD monitors offer exceptional quality, innovative features and are all backed by an outstanding 3-year replacement warranty.

The view is better with LG.

www.LGUSA.com

LG
Life's Good

Spotlight Contents

56 DIY Networking
Tips, Tutorials & Advice For Hooking Your Systems Up

66 Build Your Next-Gen Network Now
Getting To Know The Tools Of The Trade

A solitary standalone PC without Internet access is becoming a quaint, archaic oddity; connectivity is so basic, we now just assume it will be there. But networking seems to be one of the last frontiers where even experienced users may still feel a tad uncomfortable messing about. Power users who otherwise fearlessly strip out components and rebuild the guts of their rigs can become mewling kittens when confronted with a downed network. We know; we've seen it happen.

But have no fear. The home networking arena has expanded and evolved considerably since our last in-depth look ("Next-Gen Networks," *CPU* September 2002), which is why we have chosen to dive in headfirst and present this collection of hands-on, step-by-step networking setup tips to take you from basic Internet connection sharing to full-on remote access/control of your PC. Along the way, we'll be installing wired and wireless home networking solutions (page 56) and considering the best products to use for those planning on building or upgrading to a wired home (page 66). First, we'll take a look at the current state of home networking and where it's headed.

Making The Connection

Your network is really just a set of connections. On the most basic level, as soon as you attach stuff to your PC, you have a network, but the common current usage of the term more specifically refers to a set of connections that allows sharing of files or resources (such as Internet access or a printer) across multiple PCs. When Microsoft took the painful process of networking hardware setup and made it an accessible software feature of your operating system through the New Connection Wizard, it became like indoor plumbing: Unless you've lived without it, you may not fully appreciate how truly wonderful it is. Streamlined setup through wizards is now the norm. In fact, Intel's latest incarnation of wireless networking setup, built in to the Grantsdale chipset, is as little as four mouse clicks away from start to installed, with a few more if you want security, which you are required to at least consider.

That does not mean things have become less confusing on the hardware side. A veritable cornucopia of ever smaller, faster, more reliable, and less expensive wired and wireless networking devices has become a common addition to the home-computing landscape. Understanding the differences between similarly described (and sometimes even similar-looking) access point, router, and gateway

Technology Spec Chart

WIRED

	Known As	Designation	Speed	Cable Type	Max. Cable Length
802.3	Thicknet	10Base-5	10Mbps	RG-58 coax	500m/1,640 ft.
802.3a	Thinnet	10Base-2	10Mbps	RG-58 coax	185m/606 ft.
802.3i	Twisted-Pair Ethernet	10Base-T	10Mbps	CAT 3 or UTP*	100m/328 ft.
802.3u	Fast Ethernet	100Base-T	100Mbps	CAT 5 UTP*	100m/328 ft.
802.3z	Gigabit Ethernet (GbE)	1000Base-T	1Gbps	CAT 5e UTP* copper	100m/328 ft.
802.3ae	10Gigabit Ethernet (10GbE)	10GBase-T	10Gbps	Multimode Fiber—enterprise only**	

*UTP: Unshielded Twisted-Pair ** A bargain at less than $5,000

hardware, along with wireless versions of each, various NIC (network interface card) devices, and the whole 802.something alphanumeric soup, can be daunting. The upside is that you do have a lot of nice options available, so here is the rundown of basic home network components.

Ethernet network adaptors. Plugging a CAT 5 network cable into an onboard PCI Ethernet NIC was often a user's first experience with building a network. Using a crossover cable to directly connect two computers without using a switch, router, hub, or excessive swearing was the ultimate in head-to-head gaming. Now that motherboard manufacturers are incorporating Ethernet into their products and convenient, though limited, hot-swappable USB network adapters have arrived on the scene, there are alternatives to the PCI add-in network adaptor card (not that they are slipping away into "remember when" status just yet). The wireless versions of desktop network adapters have proven to be really handy for connecting remote PCs without stringing wire everywhere, but if you are accustomed to wired speeds, be prepared for the slowdown.

A PC Card network adapter (often misidentified as a PCMCIA card after the responsible standards body) can provide the same functionality for notebooks as a PCI Ethernet card does for desktop PCs. Its obsolescence may be in the cards, however, with the arrival of dual-standard PCMCIA ExpressCard (www.expresscard.org) format later this year. Folks seem to upgrade notebooks faster than desktops, so PCI Express adoption may happen more quickly there. Smaller, faster, and less power hungry, ExpressCard incorporates USB 2.0 and the new PCI Express standard. Following the reverse trend of mobile technology now migrating onto the desktop, ExpressCard will be showing up for desktop and could be especially attractive in SFF PCs. Wireless versions of each of these devices are widely used or anticipated. A CompactFlash wireless network adapter can keep your PDA connected, and a wireless print server can bypass the need for the printer host PC to be on, as well as allow the printer to be conveniently located instead of awkwardly sitting atop that stack of encyclopedias next to your desk.

Routers, switches, and access points. Modern routers incorporate both the switch function for connecting multiple PCs together to form a home network and the router function of connecting that network to a broadband modem for access to the Internet. Many have a built-in firewall for security, but even without it, a router offers more protection than plugging your PC directly into a DSL or cable modem. Wireless routers also have a built-in wireless access point, which adds the freedom of remote, untethered computing to your wired network, provided you have the corresponding wireless network adaptor installed on your notebook or PC. If you already have a nonwireless-enabled router and want to add wireless to your network, a standalone wireless access point is in order. While routers, switches, and access points have become quite sophisticated, hubs, with their inability to connect at full duplex speed and configuration limitations, have been displaced.

What's your address? NAT (network address translator) is a method for using one IP address to connect multiple computers to the Internet by translating local IP addresses back and forth to the global address. Created to cope with the world running short of IP addresses, this is also useful for security, as each PC will have a unique address not visible from beyond the Internet connection. This method is preferred by most ISPs, and you can expect to pay more for real multiple IP addresses. DHCP (Dynamic Host Configuration Protocol) dynamically assigns temporary IP addresses to devices located on the network. With DHCP, a device can be assigned a different IP address every time a network connection is made, which is a protection for individual users on multiuser machines. A MAC (Media Access

ORKING

THE BIG PICTURE

Technology Spec Chart

	Known As	Underlying Technology	Operating Frequency	Maximum Speed	Range	ETA	Target Application
802.11a	Wi-Fi	OFDM	5GHz	54Mbps	~198 ft. outdoors	Available	Home/office networking
802.11b	Wi-Fi	DSSS	2.4GHz	11Mbps	~297 ft. outdoors	Available	Home/office networking
802.11g	Wi-Fi	OFDM	2.4GHz	54Mbps	~297 ft. outdoors	Available	Home/office networking
802.15.1	Bluetooth	FHSS	2.4GHz	720Kbps	Up to 33 ft.	Available	Cable replacement
802.15.3	Ultra Wideband	OFDM	3.1GHz to 10.6GHz	480Mbps	Up to 33 ft.	~2005	Wireless USB 2.0
802.16a	WiMAX	OFDM	2GHz to 11GHz	70Mbps	Up to 31 miles	~2006	Last-mile broadband
802.20	MBWA	Currently Flash-OFDM	< 3.5GHz	1Mbps+	Up to 9.3 miles	Unknown	Mobility (> 150mph)

Control) address (also called physical or hardware address) is a unique hardware number of a networking device. It allows networking devices to identify each other on the network.

Although wired Ethernet is the workhorse of home networking, most of the juicy stuff happens over in wireless land.

A World Unwired

Several years have passed since 802.11b wireless networking broke onto the scene, leaving even the most jaded tech journalists with jaws agape. Despite the protocol's modest 11Mbps transfer rate and susceptibility to interference from other devices on the 2.4GHz frequency band, it continues to enjoy rapid adoption and widespread use.

So where does wireless technology stand now that the befuddling amazement of 802.11b has died down to an approving acceptance? There's been plenty of progress, that's for sure. 802.11a has arrived, its delay caused by the technical difficulties of implementing the 5GHz radio and encoding techniques required by the standard. At 5GHz, it circumvents the interference problems known to plague 802.11b devices but at the same time suffers slightly reduced range. The principle benefit, of course, is the use of OFDM (Orthogonal Frequency Division Multiplexing) to transmit data over multiple subchannels, enabling up to 54Mbps of throughput.

Perhaps the most significant development since 802.11b debuted was the ratification of 802.11g, another 2.4GHz protocol that incorporates the benefits of its two predecessors. Like 802.11a, 802.11g employs OFDM to reach speeds up to 54Mbps with the stipulation that all clients conform to the g standard for full performance. It does offer backward compatibility with 802.11b, though, making 802.11g the most flexible standard, even amidst reduced speed when an 802.11b client connects. 802.11g is still susceptible to interference from other 2.4GHz devices, but in most home environments, the degradation is negligible. Indeed, In-Stat/MDR forecasts that shipments of 802.11g hardware will eclipse 802.11b this year as proprietary modifications to the spec enable throughput in excess of 100Mbps.

But the ratification of 802.11g did more than just standardize the latest wireless protocol; it also opened the door for subsequent enhancements, a number of which are already on the way. 802.11e, for example, is aimed at adding QoS (Quality of Service) to wireless networks that currently treat all data packets with equal priority. The goal of 802.11e is to make sure video, audio, and VoIP applications function properly as they do today on wired networks by prioritizing data, giving precedence to appropriately flagged packets.

The upcoming 802.11e standard will also add packet bursting, a feature that claims to augment performance primarily in mixed-mode (802.11b/g) environments. In fact, several manufacturers have already incorporated packet bursting into firmware updates to improve efficiency. Once the standard is ratified, which may happen as soon as this summer, another round of firmware patches should add official support to existing hardware, though a series of upgrades may be needed to ensure true interoperability.

Call security. While many of the advances in wireless technology revolve around enhancing performance, security is comparably important, especially to businesses dealing with sensitive information. It's no secret that WEP (Wired Equivalent Privacy), the first attempt at securing wireless networks, is riddled with vulnerabilities. WPA (Wi-Fi Protected Access) replaces WEP, adding user authentication via 802.1x and EAP (Extensible Authentication Protocol). WPA also features enhanced data encryption through TKIP (Temporal Key Integrity Protocol), which uses the same stream cipher as WEP but adds 48-bit initialization vectors, per-packet key construction, and message integrity code to guard against forgery attacks. The Wi-Fi Alliance claims that all certified hardware is software-upgradeable to support WPA, but older 802.11 access points may lack the processing power to support WPA, according to D-Link's Michael Scott. Microsoft's Ethernet-to-wireless adaptor for Xbox doesn't include WPA support because it is not required for application-specific devices.

In all actuality, WPA is simply a subset of the 802.11i standard, which will probably be ratified this summer. Based on the 128-bit AES (Advanced Encryption Standard) protocol, 802.11i, to be known as WPA2, will boast much stronger encryption than TKIP, in addition to the provisions introduced by WPA. Unfortunately, real-time encryption and decryption of AES' 128-bit ciphers is too demanding for many access points manufactured before 2003. Thus, full compliance with WPA2 will require that early adopters of wireless technology purchase new equipment.

The IEEE has another standard on its plate, 802.11n, chartered to enable throughput in excess of 250Mbps over wireless networks. While 802.11n is still in its infancy, the task group's goals are already roughly laid out. Allowed changes will include enhancements to 802.11, meaning backward compatibility with the a, b, and g extensions is imperative, though there aren't yet any requirements pertaining to mixed-mode performance. The Wi-Fi Alliance is also lobbying for improved range, resistance to interference, and uniform coverage within a network.

With such ambitious objectives and a narrow timeline (the finalized standard is expected late 2005), it's no wonder that there are a number of solutions being proposed to address 802.11n. Multiple antennas, enhanced modulation, and expended bandwidths are all on the table. Channel bonding, the technique whereby multiple channels are combined to accelerate data transfers, is not an option because it often interferes with other devices sharing spectral resources.

MIMO. Waiting for these newer and technically more advanced standards to show up is one thing, but the flavor of the month in extending wireless networking currently seems to be MIMO (multiple input, multiple output) technology. Chipsets using MIMO send information out over multiple antennas, and the radio signals reflect off of objects allocating multiple paths and more bandwidth for information to be broadcasted. This information is then gathered back by an AP and recombined with MIMO algorithms. Multiple signals also mean that the reliability will be improved. Performance is one aspect of improvement, but a second benefit is the additional range and stronger broadcast signals made possible with MIMO.

Currently the 802.11g's 300-foot range is still considered too limited for general corporate use in larger buildings. MIMO technology is being applied to current standards such as 802.11g, and because it requires fewer access points, it could help make Wi-Fi more viable in the corporate space. Companies such as Airgo are adding MIMO to their products with claims of a 3X improvement in range and a 4X improvement in speed, while projecting an additional $20 per wireless card. NETGEAR and Toshiba have created chips that double the current 802.11g

Technologies On The Horizon

With so many innovations hitting at once, this could be an enormous list. We've grabbed just a few interesting items to get you thinking.

WiFi Seeker

Chrysalis
www.wifiseeker.com

If you travel with a wireless-enabled notebook, you may want to take a moment and sign up to be notified when this little gadget becomes available. It is "a compact wireless network locator that detects 802.11b/g signals. WiFi Seeker eliminates the need to turn on a notebook in order to determine the presence and signal strength of a network while in airports, coffee houses, conference halls, hotel lobbies, as well as other public and private locations. Chrysalis' patent-pending design provides today's increasingly mobile population with a highly reliable, easy-to-use device that just slips into a pocket or purse. The device's wireless network signal strength indicator allows users to quickly determine the quality of the network's signal and distinguishes between the presence of a wireless network and other devices generating RF energy in the same frequency ranges." The WiFi Seeker is $29.95 plus shipping and handling and will be available in "early Q3" 2004.

Universal Communicator Handset

Intel Research Labs
intel.com/labs/wireless/bwt

No, this is not "Star Trek." Intel Research has teamed up with Kodak, Telesym, and DigitWireless to define a "first-generation prototype of a 'universal communicator'-class device." Built around Intel's XScale technology, the device would be able to transparently access four networks: GSM/GPRS, GPS, 802.11b, and Bluetooth using an early version of Intel's "Adaptive Radio Architecture." The Universal Communicator Handset device would allow users to switch between different networks to access voice, Internet, and diverse wireless applications with the same handset, depending upon need and geographic location. The handsets could support WWAN-WLAN voice call roaming, streaming multimedia, and cross-network GPS and WLAN location. OK, so maybe it is "Star Trek," but we still want it. Now, please.

Vehicle Telematics

Auto Industry
www.telematicsupdate.com

Analysts predict that by the end of the decade, at least 50% of all new cars and light trucks built will have some form of telematics system deployed in them. In a nutshell, telematics is car-based computing and connectivity. If you can imagine it, somewhere there is an engineer trying to cram it into your glove box: OnStar on steroids. The new areas will be in driver safety systems such as proximity and lane drifting alerts, adaptive cruise control, and voice-driven everything, including Internet access. "Driving while surfing" could become a checkbox on your next moving violation receipt.

standard's performance from 54Mbps to 108Mbps—in theory, anyway. MIMO development may take awhile to catch on and may only go mainstream with later 802.11n standards, which Intel has already stated will be using MIMO technology. Meanwhile, Europeans might benefit from MIMO in 3G phones, thanks to Lucent Bell's achievement of boosting performance from 384KBps to 19MBps on 3G phones.

If MBps speeds all seem too slow for you, how about GbE for wireless? Sounds out there, and perhaps it is. NewLANS is currently working on a multigigabit data rate solution for wireless Gigabit to the desktop (GTTD) with operating frequencies in 56+GHz bands with the FCC opening up the spectrum. 2GBps on a wireless PC sounds extremely tasty, but don't get your hopes up. It's going to take a lot more time, money, and development to get us from Wi-Fi to Gi-Fi. (For more on wireless broadband technology, see page 42 of this issue.)

Feed Your Head

Is there an ideal home networking setup? Is your family ready to appoint one member to be the IT support person-someone who will be in charge of designing, building, and maintaining the networking infrastructure needed to keep the whole family wired (and unwired) as new technology becomes available, new security risks arise, and needs change? What will it take to make your network sing? After evaluating your current and future networking needs and desires, making product purchase decisions can be a bit daunting, but at least implementation of basic configurations is not the nightmare it once was.

To get started, you can aid the evaluation process somewhat by poking around in the "learn about networking" sections of the major networking hardware vendor Web sites. Their wizard-style approach to choosing a network configuration will be limited by the range of products they offer, so pick a large company with a wide variety. Use the network example pages as jumping-off points to get an idea of what your network should look like and how well your needs match the kinds of setups the manufacturer anticipated when they designed their products. Choosing a manufacturer that has created products for how you will want to use them should give the best overall results.

Knowing what networking gear you already have and what its limitations/compatibility issues are is important. Don't forget to include your dial-up, DSL, or cable modem issues along with your ISP's policies and procedures limitations. Some ISPs have limitations on networking support. (AOL Broadband, for example, uses a nonstandard connection method to authenticate users that can interfere with multiple PC access. Actiontec, NETGEAR, and Linksys offer selected router models that work with some but not all AOL Broadband modems.) So, it is very important to go to your ISP's site and read up on its recommended networking hardware and configurations. Next, focus on your networking desires—not just immediate needs, but long-term, want-to-have features and capabilities. You may not get them all at once, but your purchase decisions should be determined by what the whole system will eventually need to do. You can pretty much assume that anything and everything will get wired at some point, so list the oddball stuff, too. If having two-way audio and Web cam assisted online remote control of your electronic doggy door is a must, it can be done.

Jargon Watch

AP (access point)–A station ("box" or transceiver) that can send and retrieve data across a network without the need for wires. It can also serve as the point of interconnections between a WLAN and a fixed wire network and be used to expand the range of a wireless network.

DHCP (Dynamic Host Configuration Protocol)–A protocol that lets a DHCP server assign temporary IP addresses to the other network devices.

full duplex–Simultaneous speed of transmission and retrieval of data by a networking device.

gateway–A system that interconnects networks.

half duplex–The transmission of data in both directions over a single line but only one way at a time.

IPCONFIG–A Windows utility that shows the user his device's IP address.

NAT (Network Address Translation)-Translation of IP addresses from a LAN to a different IP address for usage over the Internet.

PAN (personal area network)–A small, single-person network, typically no more than a few feet in range connecting wireless devices such as a PDA, printer, and a notebook.

PING (Packet Internet Groper)–A utility that shows if a certain IP address is accessible at that given time.

port–A physical port is the connection point on a computer or networking device used for plugging in a cable or an adapter. A port is also used to describe the virtual connection point through which a computer uses a specific application on a server.

PoE (Power over Ethernet)-Technology that lets a network cable transfer data and handle power.

PPPoE (Point-to-Point Protocol over Ethernet)–A type of broadband connection that requires a username and password for authentication before connecting.

SMTP (Simple Mail Transfer Protocol)– The standard Internet email protocol.

SPI (Stateful Packet Inspection)–A firewall capable of checking incoming packets to make sure they correspond to an outgoing request and block unsolicited ones.

SSID (Service Set IDentifier)–A wireless network's name.

A network is a living thing. If you upgrade/mod your PC, you already have the mindset to approach the real art of networking. You are constantly looking at new hardware and software capabilities, evaluating features to see if they are useful or interesting to you. On the other hand, if you are not really the adventurous type, there are plenty of solutions that do not require opening your PC or learning much beyond acquiring an IP address and plugging in cables. You can still have great, useful features such as network-based printer sharing that allow access without requiring that another PC be turned on.

The past 18 months have been really great for consumers of networking gear. 802.11g technology has come in at reasonable prices with great features while knocking down the cost of 802.11b hardware. Every networking hardware company has been scrambling to meet the accelerated rate of adoption for wireless technology, and because all wireless has to go into the wall at some point, that has impacted wired, as well. There are individual component devices for everything, and there are a growing number of all-in-one solutions that attempt to include all networking functionality in one box: gateway, router, wireless access point, network printer server, even Web cam support can be found listed as features of some combination hardware. Just be sure to read the fine print, as you may not be able to use all features simultaneously. The move is definitely toward combining functionality and improving awareness of security issues.

Meanwhile, the definition of a network is expanding rapidly in the direction of encompassing virtually all forms of computing and electronic communication, so changing how you think about networks and networking is a good idea. Satellite TV reception is via dish, but authentication travels through the phone lines to the provider's servers, which can be accessed on your PC via Internet connection. Logged in to your satellite TV service account, you can order movies that then appear on your television, which are paid for when you log in to online banking and make an electronic payment. Nowhere along the line has anyone so much as licked a stamp or left the house. Is this a home network? It certainly is one mighty set of connections.

by Joan Wood and Chris Angelini

Can't find the term you're looking for? Subscribers can see www.cpumag.com/cpujul04/jargon for more Jargon Watch terms.

TCP/IP (Transmission Control Protocol/Internet Protocol)–A network protocol for the transmission of data, which needs to be acknowledged by the recipient of the data sent.

Telnet–A TCP/IP command protocol that can allow the user to access remote PCs.

topology–The layout of a network; a schematic description of the network itself in terms of its possible connecting lines and nodes.

VPN (Virtual Private Network)–A security feature that protects data from one network to another across the Internet.

WAN (wide area network)--Another name for the Internet.

Unwired Rankings

Once you're done with security at the airport and have an hour or two to kill, why not slip out that notebook and check your email, bid on that eBay item, or just go surfing? Intel's second annual "Most Unwired Airports" survey revealed rather forward-looking trends where wireless connectivity is concerned. More U.S. airports are providing travelers with wireless Internet access. The survey was conducted by researcher Bert Sperling, who is well-known for his previous "Best Places" surveys, and the findings are based upon the number of commercial hotspot locations and the number of flights at each airport. Here are the top 10:

1. Dallas-Fort Worth International (Dallas)
2. LaGuardia International (New York)
3. Atlanta Hartsfield International (Atlanta)
4. O'Hare International (Chicago)
5. Baltimore/Washington International (Baltimore)
6. Minneapolis/St. Paul International (Minneapolis)
7. Seattle-Tacoma International (Seattle)
8. San Francisco International (San Francisco)
9. Los Angeles International (Los Angeles)
10. Denver International (Denver)

Interestingly enough, Silicon Valley's San Jose International failed to make the top 10 but did come in 11th place. You would also think that JFK International (New York) would have fared better than 25th place. Wi-Fi users who live in the Bay Area can feel very lucky to have come out on top in a similar survey that identified the top 100 most unwired cities in the United States. The top 10 are as follows:

1. San Francisco-San Jose-Oakland, Calif.
2. Orange County, Calif.
3. Washington, D.C.
4. Austin-San Marcos, Texas
5. Portland, Ore.; Vancouver, Wash.
6. Seattle-Bellevue-Everett-Tacoma, Wash.
7. Bergen-Passaic, N.J.
8. Middlesex-Somerset-Hunterdon, N.J.
9. San Diego, Calif.
10. Denver, Colo.

Honolulu almost made it, placing 13th, but surfing of a different kind is obviously more important in Daytona Beach, Fla., which placed 97th. If you're pondering that difficult "where do I go to college" decision and intend on being connected, then consider Indiana University - Bloomington, which came top of the pile in the "100 Most Unwired Campuses" survey. You would have thought Stanford University-Palo Alto, Calif., would have faired better than 67th place, but perhaps they are communicating on a different level. The results of this survey were published on Intel's Web site in April of 2004.

by Alex Ross

DIY NETWORKING

Tips, Tutorials & Advice For Hooking Your Systems Up

With the proliferation of multicomputer homes and broadband Internet access, the need and desire to connect those computers has increased exponentially over the last few years. Having a group of PCs networked isn't just for sharing files among the systems and accessing the Internet via a single connection, however. A properly equipped and configured home or small-business network opens up a whole new world of useful and fun possibilities, such as remotely controlling your home PC from the road or hosting a dedicated game server to ensure that you and your cyber-friends always have an available location to get your game on.

Unfortunately, setting up and maintaining a home network isn't always easy, and security is always a top priority. To that end, we will describe several home network-related projects on the following pages ranging from the basic to advanced, arm you with the tools you will need to help your network work properly, and help ensure that no one is snooping around your digital domain uninvited. Hopefully, by the time we are done, you will have the confidence to tackle some of these projects on your own. (For the instructions and examples in this article, we are using Windows XP unless otherwise indicated.)

Now Serving: MP3s & Streaming Video

One of the most sought-after additions to any home network is also one of the toughest to define. Ask anyone with a large MP3 or video collection if she'd like a central location on her network to store all her files and she will almost certainly answer a resounding, "Yes." A media server serves that purpose, but designing one can be somewhat confusing.

The first step is deciding what the media server's primary purpose will be. If the system will only store an MP3 collection, a modest rig with adequate storage will do. You may even be able to recycle an older system by just adding a larger hard drive and more RAM (256MB or more). If you plan to stream video across the network or incorporate it into a home theater, however, a more powerful SFF system with a fast hard drive and video card is a better fit. For our purposes, we'll outline plans for a semi-high-end home theater PC/media server that can stream TV, audio, and video while accommodating many media types.

A Shuttle XPC SFF system is an excellent starting point. XPCs are quiet and offer a slew of integrated components. We particularly like XPCs based on the relatively new G4 enclosure, which incorporates a 6-in-1 USB 2.0 card reader that makes it easy to copy photos or other files to the system from the most popular flash media types. Like Shuttle's XPCs, most SFF systems incorporate other necessary components, such as video, sound, and Ethernet controllers.

The next consideration is how much hard drive space you'll need and what type of removable drives or optical storage you'll need. We believe that the bigger the drive the better. Also, gravitate toward 7,200rpm or faster drives with large caches. Such drives are more adept at streaming video and can better accommodate multiple connections to the server. Consider a CD-R/DVD combo drive or DVD recorder a prerequisite so you can play CDs and DVDs, plus burn audio CDs.

For connecting the media server to the network, wireless or wired connections will work, but a hardwired connection will be much faster, more stable, and immune to RF interference. If you absolutely want to go wireless, use the fastest devices you can afford. 802.11a is currently relatively expensive but is the best choice, as it's faster than 802.11b and 802.11g and is less susceptible to interference from microwave ovens and cordless phones. 802.11g should provide acceptable performance in most circumstances, but steer clear of 802.11b.

If you're using your media server for audio only, a low-end CPU is fine, and even a Pentium III will do. For streaming video and DVD ripping/playback/recording, you'll want a faster CPU. Anything over 2GHz should be fine, but the faster the better. Consider 256MB of RAM the absolute minimum; 512MB or 1GB is preferable, especially if your media server is the hub of a home theater and you may use it for gaming. For a simple audio

The Remote Wonder II operates from up to 60 feet away and works with many popular multimedia applications, including Winamp and PowerDVD.

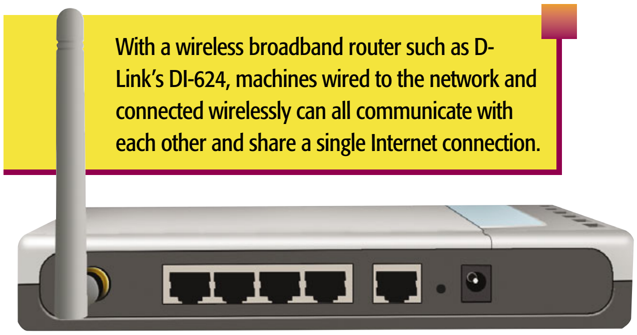
server, integrated video will do, but ATI's All-In-Wonder line of video cards has useful features that are a welcome addition to any media server. With newer versions of ATI's proprietary Multimedia Center software, ATI introduced Easy-Share, which lets you access all the features of an All-In-Wonder card over a network. Newer All-In-Wonders also ship with an RF remote control that'll let you control the system from up to 60 feet away.

ATI's AIW 9600 XT complete set of multimedia features included a TV tuner, FM tuner, and PVR functionality. Its 128MB of RAM and Radeon 9600 XT GPU also make it a great choice for gaming.

Share An Internet Connection

Thanks to tools built into WinXP and the ever-decreasing cost of networking hardware, it has never been easier or cheaper to share a single Internet connection between multiple computers. With dual Ethernet controllers (which are necessary to share a broadband connection) or a NIC and a modem (necessary to share a dial-up connection) installed, enabling ICS (Internet Connection Sharing) with WinXP takes only a few mouse clicks. When sharing a dial-up connection, keep in mind that if two users are downloading data while using the shared connection simultaneously, each user will use half of the available bandwidth, making that already slow dial-up connection even slower.

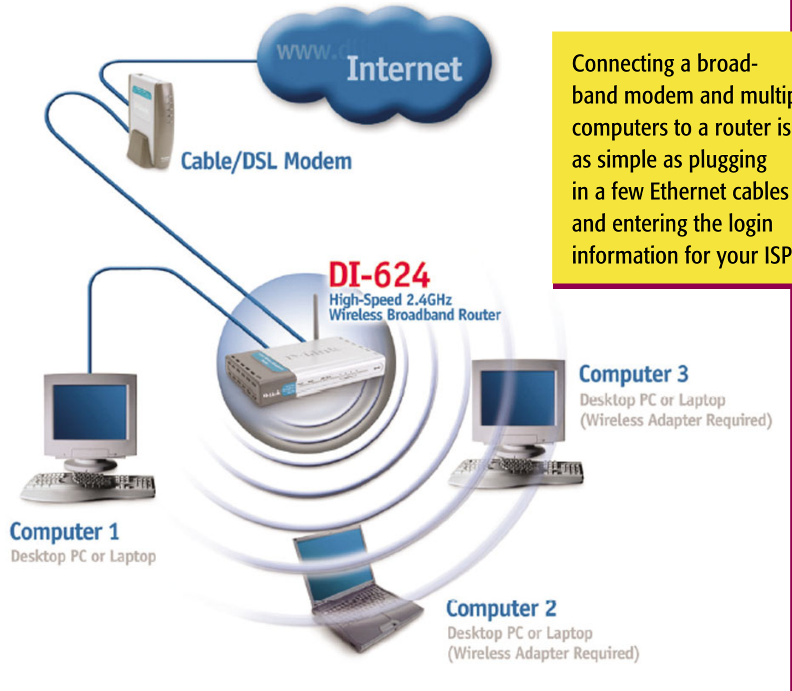
To enable ICS, right-click My Network Places and choose Properties on the computer that has the Internet connection. Right-click the entry corresponding to your Internet connection and choose Properties from the menu. Click the Advanced tab, check Allow Other Network Users To Connect Through This Computer's Internet Connection, and click OK. You then have to set the TCP/IP properties on the other machines on your network to Obtain An IP Address Automatically and Obtain DNS Server Address Automatically. This is the default configuration when you install WinXP. You may need to restart the machines to correctly assign the IP addresses to each system, but this typically is all it takes to share a connection.



With a wireless broadband router such as D-Link's DI-624, machines wired to the network and connected wirelessly can all communicate with each other and share a single Internet connection.

WinXP's ICS utility works well, but there is a much better option for broadband owners. Broadband routers, many available for less than $75, let you not only share a connection but also add a layer of protection. Most broadband routers use NAT (Network Address Translation), which allows for one set of unregistered IP addresses for internal network traffic and another set for external traffic. This means you can use one registered IP address (assigned to you by your ISP) with a router to offer Internet connectivity to workstations on your LAN so that each has its own private IP address that's not visible to public servers.

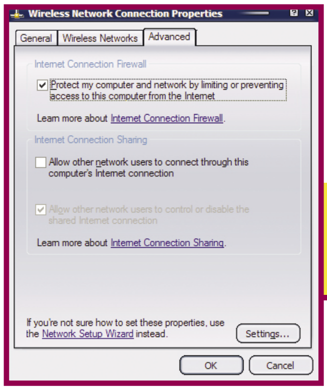
Installing a broadband router is extremely easy, provided your machines are all equipped with NICs. Routers generally have a single Ethernet connector, usually labeled WAN or Internet, where your broadband modem gets connected. Routers also have a few other Ethernet connectors for the other machines on the network. Plug your machines in using standard CAT 5 cabling, and that's all there is to it. To configure the router, usually all that's necessary is logging in to it using your Web browser. Once logged in, you can enter specific settings for your ISP, enter rules for Internet access, and alter other options. Each router is different, so consult the manual for more specific instructions.



Connecting a broadband modem and multiple computers to a router is as simple as plugging in a few Ethernet cables and entering the login information for your ISP.

Lock Down

Ensuring that your OS is fully patched is the first step to protecting your system from internal and external threats. Make Microsoft's Windows Update site a weekly stop, or better yet, enable automatic updating and schedule updates to run automatically when you're away from the system. Many updates are released specifically to plug security holes in the Windows OS. Plug these holes before your system is attacked. Most of the steps outlined later in the "Fighting The Malware Menace" section also apply here. You should equip each network machine with up-to-date antivirus and anti-spyware software and, at the bare minimum, enable the simple firewall built in to WinXP.


Wireless Network Connection Properties
General
Wireless Networks
Advanced
Internet Connection Firewall
☑ Protect my computer and network by limiting or preventing access to this computer from the Internet
Learn more about Internet Connection Firewall.
Internet Connection Sharing
☐ Allow other network users to connect through this computer's Internet connection
☑ Allow other network users to control or disable the shared Internet connection
Learn more about Internet Connection Sharing.
If you're not sure how to set these properties, use the Network Setup Wizard instead.
Settings...
OK
Cancel

There are other basic steps you can take. Even if you're the only person using the system, make sure the administrator account and user accounts all have login passwords. The passwords should consist of uppercase and lowercase letters and numbers. Complex passwords are more difficult to crack with brute force methods, and not having passwords for all user accounts virtually guarantees the system will be compromised should it be targeted. We also recommend disabling File And Printer Sharing, if possible. If you must have it enabled, turn on Advanced File Sharing for more control over who has access to what. To enable Advanced File Sharing, go to My Computer, click the Tools menu, and select Folder Options. In the Folder Options window, click the View tab and scroll to the bottom of the list of options. Remove the check mark next to Use Simple File Sharing.

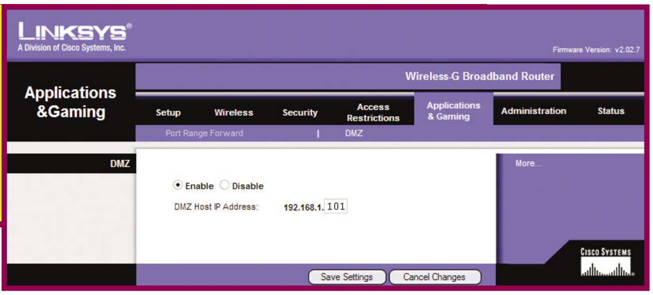
With simple file sharing disabled, you can now choose which network users will have access to shared folders. You can also set the maximum number of connections. If you have only three systems on the network, set the maximum number of connections to three. No one else will be able to access a shared folder when all the systems are connected. Disabling simple file sharing also lets you assign permissions to each user account (or permissions to users on a domain). If you want user account A to be able to modify files in a shared folder but want to limit user account B to read-only access, you can do so.

It's not the most powerful firewall out there, but you can enable WinXP's Internet Connection Firewall on any system that's connected to the Web.

If you have a wireless LAN set up, make sure that WEP is enabled at all times, using the highest level of encryption available with your router. Also change the default SSID (service set identifier) and the default administrator password. When the network isn't in use, shut off the wireless router. A hacker can't attack what isn't available.

Enter The DMZ

With the DMZ disabled, the router protects all machines on the internal network.

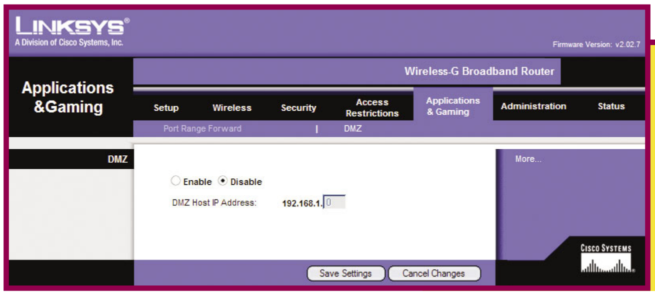


● Enable ○ Disable
DMZ Host IP Address: 192.168.1. 101

Unless you've worked on a large, enterprise-class network, you may be unfamiliar with the term DMZ (demilitarized zone) as it relates to networking. A DMZ is a public portion of an internal network commonly used for servers that are accessed by external clients on the Internet, such as Web, FTP, and email servers. By placing these public servers on a separate, isolated part of the network, you provide an extra layer of security for your internal network. Overall network throughput can also be increased because external traffic will no longer saturate your internal network.

You can configure your home network in a similar manner, but setting up a DMZ usually means exposing one system to the Internet to serve a specific purpose, such as hosting an email server or testing Internet-connectivity problems that a closed port may cause. With most broadband routers, setting up a machine on a DMZ means all data coming in on all ports will be forwarded to that one machine. The computer (or computers) in the DMZ loses firewall protection and is exposed to exploits from the Internet. In general, this is bad, but setting up a machine in a DMZ may be necessary for some purposes, such as multiplayer games.

Depending on the router, setting up a DMZ is usually simple. On our Linksys WRT54G, we logged in and selected the Applications And Gaming menu and enabled the DMZ. We then entered the IP address of the machine we wanted in the DMZ, saved the changes, and were done. The machine in the DMZ can no longer connect to the other systems on the internal network, but it will be available to the public.



○ Enable ● Disable
DMZ Host IP Address: 192.168.1. 0

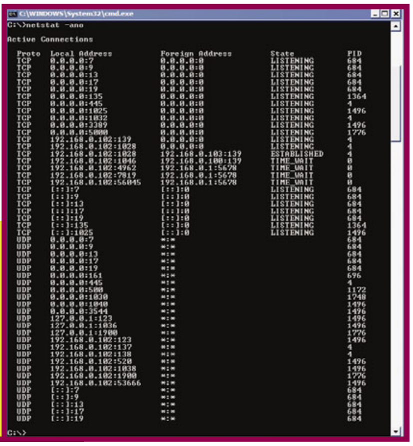
With the DMZ enabled, a machine with an internal IP address 192.168.1.101 is exposed to the public.

Open Ports: Friend & Foe

Computers using TCP/IP communicate with each other over a network via ports. Many ports are designated for commonly used network services, such as HTTP (port 80) and FTP (port 21). Sending/receiving data via open ports is necessary for a TCP/IP network to function. Unfortunately, any program or service monitoring an open port represents a potential risk.

If the program or service can't recognize when too many requests are coming in, and it can't reject unwanted requests, it may fully utilize a machine's resources trying to handle them all. This is how many DoS attacks cripple a server. If an app or service has a flaw that lets an attacker overwrite memory (a buffer overflow), the system can be taken over completely. Trojans and other malware often reveal themselves because they monitor and open specific ports.

With numerous types of malware aggressively searching for vulnerable machines, it's important to know how to check systems for open ports. One way is to use the Shields Up! tool (free) at Gibson Research (grc.com). Shields Up! scans a system, reporting the ports that are open and how to close or hide them.



```
C:\>netstat -ano

Active Connections

  Proto  Local Address          Foreign Address        State           PID
  TCP    0.0.0.0:7              0.0.0.0:0              LISTENING       684
  TCP    0.0.0.0:9              0.0.0.0:0              LISTENING       684
  TCP    0.0.0.0:13             0.0.0.0:0              LISTENING       684
  TCP    0.0.0.0:17             0.0.0.0:0              LISTENING       684
  TCP    0.0.0.0:19             0.0.0.0:0              LISTENING       684
  TCP    0.0.0.0:135            0.0.0.0:0              LISTENING       1364
  TCP    0.0.0.0:445            0.0.0.0:0              LISTENING       4
  TCP    0.0.0.0:1025           0.0.0.0:0              LISTENING       1496
  TCP    0.0.0.0:1032           0.0.0.0:0              LISTENING       4
  TCP    0.0.0.0:3389           0.0.0.0:0              LISTENING       1496
  TCP    0.0.0.0:5000           0.0.0.0:0              LISTENING       1776
  TCP    192.168.0.102:139      0.0.0.0:0              LISTENING       4
  TCP    192.168.0.102:1028     0.0.0.0:0              LISTENING       4
  TCP    192.168.0.102:1028     192.168.0.103:139      ESTABLISHED     4
  TCP    192.168.0.102:1046     192.168.0.100:139      TIME_WAIT       0
  TCP    192.168.0.102:4962     192.168.0.1:5678       TIME_WAIT       0
  TCP    192.168.0.102:7819     192.168.0.1:5678       TIME_WAIT       0
  TCP    192.168.0.102:56045    192.168.0.1:5678       TIME_WAIT       0
  TCP    [::]:7                 [::]:0                 LISTENING       684
  TCP    [::]:9                 [::]:0                 LISTENING       684
  TCP    [::]:13                [::]:0                 LISTENING       684
  TCP    [::]:17                [::]:0                 LISTENING       684
  TCP    [::]:19                [::]:0                 LISTENING       684
  TCP    [::]:135               [::]:0                 LISTENING       1364
  TCP    [::]:1025              [::]:0                 LISTENING       1496
  UDP    0.0.0.0:7              *:*                                    684
  UDP    0.0.0.0:9              *:*                                    684
  UDP    0.0.0.0:13             *:*                                    684
  UDP    0.0.0.0:17             *:*                                    684
  UDP    0.0.0.0:19             *:*                                    684
  UDP    0.0.0.0:161            *:*                                    696
  UDP    0.0.0.0:445            *:*                                    4
  UDP    0.0.0.0:500            *:*                                    1172
  UDP    0.0.0.0:1030           *:*                                    1748
  UDP    0.0.0.0:1040           *:*                                    1496
  UDP    0.0.0.0:3544           *:*                                    1496
  UDP    127.0.0.1:123          *:*                                    1496
  UDP    127.0.0.1:1036         *:*                                    1496
  UDP    127.0.0.1:1900         *:*                                    1776
  UDP    192.168.0.102:123      *:*                                    1496
  UDP    192.168.0.102:137      *:*                                    4
  UDP    192.168.0.102:138      *:*                                    4
  UDP    192.168.0.102:520      *:*                                    1496
  UDP    192.168.0.102:1038     *:*                                    1496
  UDP    192.168.0.102:1900     *:*                                    1776
  UDP    192.168.0.102:53666    *:*                                    1496
  UDP    [::]:7                 *:*                                    684
  UDP    [::]:9                 *:*                                    684
  UDP    [::]:13                *:*                                    684
  UDP    [::]:17                *:*                                    684
  UDP    [::]:19                *:*                                    684

C:\>
```

The netstat utility can list all of the open ports on your system, along with the PID of the program that is listening on the port.

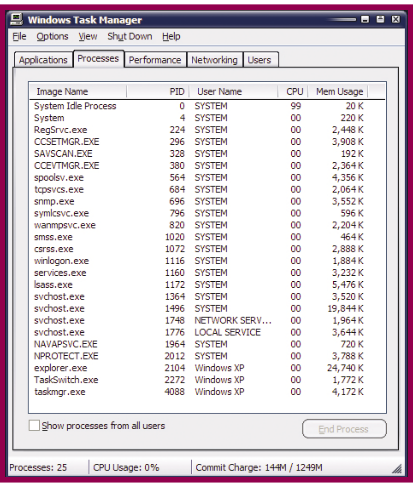


Image Name	PID	User Name	CPU	Mem Usage
System Idle Process	0	SYSTEM	99	20 K
System	4	SYSTEM	00	220 K
RegSrvc.exe	224	SYSTEM	00	2,448 K
CCSETMGR.EXE	296	SYSTEM	00	3,908 K
SAVSCAN.EXE	328	SYSTEM	00	192 K
CCEVTMGR.EXE	380	SYSTEM	00	2,364 K
spoolsv.exe	564	SYSTEM	00	4,356 K
tcpsvcs.exe	684	SYSTEM	00	2,064 K
snmp.exe	696	SYSTEM	00	3,552 K
symlcsvc.exe	796	SYSTEM	00	596 K
wanmpsvc.exe	820	SYSTEM	00	2,204 K
smss.exe	1020	SYSTEM	00	464 K
csrss.exe	1072	SYSTEM	00	2,888 K
winlogon.exe	1116	SYSTEM	00	1,884 K
services.exe	1160	SYSTEM	00	3,232 K
lsass.exe	1172	SYSTEM	00	5,476 K
svchost.exe	1364	SYSTEM	00	3,520 K
svchost.exe	1496	SYSTEM	00	19,844 K
svchost.exe	1748	NETWORK SERV...	00	1,964 K
svchost.exe	1776	LOCAL SERVICE	00	3,644 K
NAVAPSVC.EXE	1964	SYSTEM	00	720 K
NPROTECT.EXE	2012	SYSTEM	00	3,788 K
explorer.exe	2104	Windows XP	00	24,740 K
TaskSwitch.exe	2272	Windows XP	00	1,772 K
taskmgr.exe	4088	Windows XP	00	4,172 K

☐ Show processes from all users

Processes: 25 | CPU Usage: 0% | Commit Charge: 144M / 1249M

After adding the PID column to Task Manager, each running process will have its specific numeric identifier listed alongside its name.

Additionally, you can check which programs and services on your PC are listening for data on open ports. First, open Task Manager and click the Processes tab. Then click the View menu and click Select Columns. In the Select Columns dialog box, check PID (Process Identifier) and click OK. Next, open a command prompt (Start and Run), type **cmd** in the Open field, and press ENTER. Now type **netstat –ano** to list the ports your system is listening to, along with the PID of the program or service that's listening. Match the PID to the processes listed in Task Manager to see which programs are listening to which port. If something looks suspicious, a Web search should help easily identify the culprit.

Installing a personal firewall is a great way to protect yourself from attacks and hide your system from port scanners. Most personal firewalls will alert you to incoming/outgoing requests, and you can train them to learn which programs you commonly need to open and listen to on a specific port. If you have a broadband connection, we recommend installing a router that uses NAT to add another layer of protection.

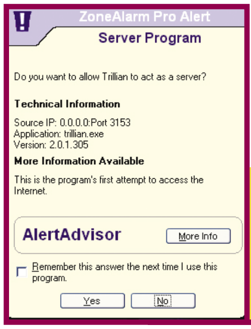
Misbehaving Firewalls

Consider firewalls necessary on any system that's connected to a network. While they are valuable security tools, firewalls can also be difficult to configure for the uninitiated and may require reading the support documentation and experimenting with different settings.

Just as firewalls are useful for protecting systems, they can also cause a few problems if access rules are too restrictive. A firewall that's blocking all traffic, for example, doesn't allow requests from a trusted computer through, meaning you can't share files or even a printer with another machine on your network. Personal firewalls can also block legitimate requests from applications that use java servlets or your Web browser to access data using the local host (127.0.0.1) address. In addition, instant-messaging programs, such as Trillian or AIM, won't work if your firewall won't open the necessary port.

Another problem commonly attributed to personal firewalls occurs when browsing the Web. Many personal firewalls block cookies and scripts that some Web sites won't work without. If you're having a problem with only parts of a certain Web page or some pages appear to be completely blank, your firewall may be the problem. An overly aggressive firewall will also stop you from being able to play multiplayer online games or prevent you from using P2P file-sharing programs because it blocks data from coming through on the necessary ports.

As a solution, try temporarily disabling the firewall to see if it's causing a problem. If your favorite game works when the firewall is disabled, you'll have to research which ports the game is trying to use and open them manually. You can configure most personal firewalls to open specific ports or allow traffic from a particular program through. Check the help file, users manual, and support information from the firewall's developer for specific instructions.



Do you want to allow Trillian to act as a server?

Technical Information

Source IP: 0.0.0.0:Port 3153
Application: trillian.exe
Version: 2.0.1.305

More Information Available

This is the program's first attempt to access the Internet.

☐ Remember this answer the next time I use this program.

You need to train personal firewalls, such as Zone Labs' Zone Alarm Pro, to learn which programs you commonly run. Clicking No in this alert will cause Trillian, a popular IM client, to stop working.

Fighting The Malware Menace

Malware describes all types of malicious software, including viruses, worms, Trojans, and most spyware. Generally speaking, attackers use malware to attack a system in some way, whether it's to monitor its activity, take control of the system, destroy valuable data, or gain access to sensitive files and other assorted information. With Malware coming in so many forms, protecting yourself from it can be daunting.

In WinXP, one of the first steps is regularly running Windows Update. New update releases make unscrupulous programmers who create malware aware of the vulnerability (if they weren't already), and they write code to specifically exploit it, knowing that unpatched machines are open to attack. Running Windows Update is as simple as launching Internet Explorer, clicking the Tools menu, and selecting Windows Update. You'll be sent to a page on Microsoft's Web site. Click the Scan For Updates link, and the patches available for your system will be made available. Install all the Critical Updates listed and restart your machine, if necessary. This will ensure that your OS is fully patched and protected until the next vulnerability is found, at which time new updates are released.

To automate the process, enable automatic updating by right-clicking My Computer and selecting Properties. Click the Automatic Updates tab and check Keep My Computer Up To Date . . . From here you can schedule when the feature will install patches and have the system automatically prompt you when new updates are available.

Having up-to-date antivirus and anti-spyware software installed adds another layer of protection from numerous types of attack. A reputable program such as Norton AntiVirus, McAfee VirusScan, or Panda Titanium Antivirus will identify, block, and quarantine most viruses, worms, and Trojans. Apps such as Lavasoft's Ad-Aware and Patrick M. Kolla's Spybot Search & Destroy can detect and remove numerous adware- and spyware-related files and modules. Using a good AV package with a trusted anti-spyware app makes for an effective one-two punch. Just be sure to keep the virus definitions and reference files up-to-date.

A firewall—software- or hardware-based—is also valuable for protecting against malware and other attacks. At the minimum, enable WinXP's built-in firewall. To do so, right-click My Network Places and select Properties. In the list of available Network Connections, right-click the LAN device you use to connect to the Web and select Properties. Click the Advanced tab at the top and check Protect My Computer And Network By Limiting Or Preventing Access To This Computer From The Internet.

Better yet, install a more powerful firewall, such as Zone Labs' Zone Alarm. Zone Alarm inspects incoming/outgoing packets. The WinXP firewall only inspects incoming data. If you have a broadband connection, also consider purchasing a router that uses NAT, even if you don't have multiple computers. Being connected to the Web behind a router that uses NAT helps hide your PC from many worms.

The most important weapon against malware is common sense. Don't open file attachments from unknown senders or click Yes when prompted to install software after browsing a Web site you don't trust. Increasing your browser's security level and installing a simple pop-up blocker can also help decrease the chances of your system being infected.

Extend Wireless Ranges

Creating a home network can be a huge convenience for many reasons, but not everyone wants to or can run long stretches of CAT 5 cable from one room to the next. In such cases, wireless connectivity is the obvious solution, but what do you do if your router or access point doesn't provide the necessary coverage to reach the far corners of your home or office? Fortunately, there are solutions to maximize the range of your current setup or increase the range using specialized hardware and antennas.

Virtually all wireless routers and access points today ship with omni-directional antennas that can send and receive signals in any direction. With an omni-directional antenna, the wireless signal is broadcast in what is essentially a giant sphere, emanating from the transceiver at the center. Should a system you're using fall outside this coverage area, it can't connect to the network. To provide the best coverage, move your router or access point as close as possible to the center of the area you would like wireless access for. Also try moving such devices as cordless phones and microwave ovens as far away as possible from your transceiver, as they are notorious for interfering with Wi-Fi devices.

The D-Link DWL-R60AT is an indoor 6dBi Microstrip antenna that can greatly increase the range of your wireless LAN.

If relocating your router or access point doesn't give you the coverage area you desire or if you can't move them from their current locations, you can also try replacing the device's antenna. Most antennas included with Wi-Fi devices are very small and are nowhere near as capable as some of the replacement antennas available from companies such as D-Link, Hawking, or Buffalo Technology.

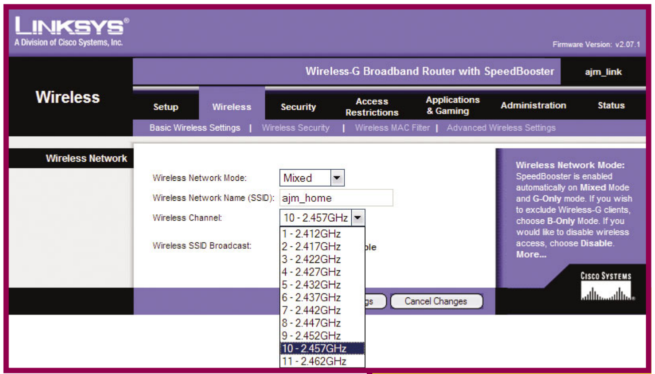
An antenna's performance, or gain, is usually measured in dB (decibels) or dBi (decibels, isotropic). Gain is the measure of an antenna's performance relative to a theoretical device called an isotropic antenna. This isotropic antenna is a hypothetical lossless antenna that radiates and receives energy equally in all directions. The higher an antenna's dB/dBi rating, the

Cordless Phones & Wireless Networks

Many wireless devices, including 802.11b and 802.11g networking hardware, operate within the ISM (Industrial Scientific Medical) band of frequencies designated as unlicensed by the FCC. Manufacturers produce wireless LAN devices to use this band because operators don't need a license to transmit at these frequencies. A myriad of other devices use the ISM band, which spans the 2.450GHz to 2.484GHz frequency range, as well. This means that there's a significant chance of RF interference if multiple devices using this band are operating within the same area.

The cordless phone is one of the most abundant devices to use the ISM band. In the past, cordless phones used lower frequencies in the 47MHz to 50MHz and 900MHz ranges. Now some new models from companies, such as Uniden, Panasonic, and Sony, are operating in the upper end of the UNII (Unlicensed National Information Infrastructure) bands at 5.15GHz to 5.35GHz and 5.47GHz to 5.825GHz. But for years, numerous manufacturers shipped phones that operated in the ISM, or 2.4GHz band, and it's these phones that can wreck havoc with most wireless networks.

The problem stems from the fact that both 2.4GHz cordless phones and 802.11b/g wireless LAN devices operate at similar frequencies. Thus, the signal from one device can easily interfere with the other. They are designed to continue operating when interference is present, but performance is degraded when conditions are not ideal. In some extreme cases, it's even possible for one device to completely stamp out the other.


LINKSYS
A Division of Cisco Systems, Inc.
Firmware Version: v2.07.1
Wireless-G Broadband Router with SpeedBooster
ajm_link
Wireless
Setup
Wireless
Security
Access Restrictions
Applications & Gaming
Administration
Status
Basic Wireless Settings | Wireless Security | Wireless MAC Filter | Advanced Wireless Settings
Wireless Network
Cancel Changes
Cisco Systems

Wireless Network Mode: Mixed

Wireless Network Name (SSID): ajm_home

Wireless Channel: 10 - 2.457GHz

1 - 2.412GHz
2 - 2.417GHz
3 - 2.422GHz
4 - 2.427GHz
5 - 2.432GHz
6 - 2.437GHz
7 - 2.442GHz
8 - 2.447GHz
9 - 2.452GHz
10 - 2.457GHz
11 - 2.462GHz

Wireless SSID Broadcast:

Wireless Network Mode: SpeedBooster is enabled automatically on **Mixed** Mode and **G-Only** mode. If you wish to exclude Wireless-G clients, choose **B-Only** Mode. If you would like to disable wireless access, choose **Disable**. **More...**

Changing the channel your Wi-Fi network uses may help decrease the chance of RF interference

Unfortunately, there isn't much you can do resolve the situation should you own a cordless phone and WLAN that don't play well together. You can try moving the phone's base away from your Wi-Fi equipment, but the handset can cause interference, as well.

Another option is changing the channel that your Wi-Fi equipment operates on. You can do this by logging into your router or access point software and accessing its wireless setup menu. From there, you should be able to select a different channel. Try each channel for an extended period, as one may be less susceptible to interference from your phone than another. As a last resort, you can replace either the phone or the Wi-Fi equipment you are using. 802.11a devices operate in the 5GHz frequency band, as do some new cordless phones. Downgrading to a 900MHz cordless phone may also also do the trick.

If connectivity outdoors is a high priority, an antenna such as D-Link's omni-directional ANT24-0800 (8dBi gain) can enlarge your coverage area drastically compared to a stock antenna.

more effective it will be at providing a larger coverage area or increasing the quality of the coverage in an existing coverage area. Installing a replacement antenna is simple. Usually all this entails is unscrewing the antenna on your router and connecting the new antenna. Just make sure the antenna included with your router or access point is removable before you buy a replacement.

An omni-directional antenna is generally the best choice for increasing your wireless coverage in all directions, but in some cases a directional antenna is a better fit. If your router or access point is located on an exterior wall and you can't move it, for example, using a directional antenna pointed at your home's interior would focus the signal where it's needed.

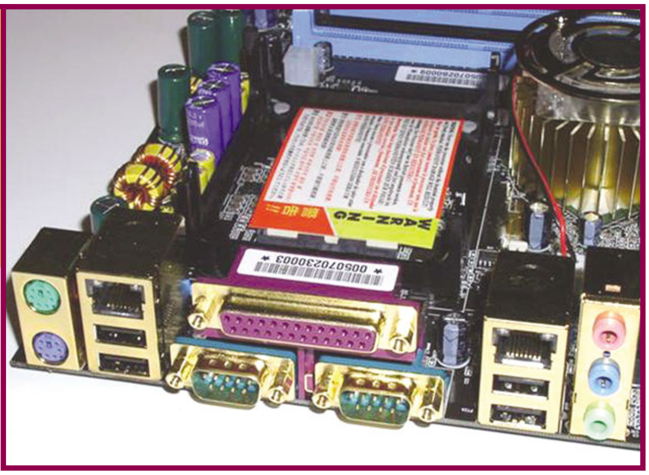
Another option for extending wireless range is adding additional access points or repeaters. You need to wire additional access points to the network, but this may be the only viable solution if a wireless signal simply can't penetrate to the areas where coverage is needed. Metal or thick concrete walls can completely block a signal, even if the transceiver is right on the opposite side. A repeater works much like an access point but doesn't need to be wired to the network. A repeater essentially receives a wireless signal, amplifies it, and rebroadcasts it at full strength. A few repeaters strategically placed throughout a building can provide complete coverage in a very large area with only a single router or access point providing the connectivity to a wired network. Repeaters aren't universally compatible though, so check your router or access point's manufacturer before making a purchase.

D-Link's DWL-G800AP repeater/access point offers data transfer speeds up to 54Mbps and can increase the range of 802.11b/g wireless networks.

Dual NICs

Often, features once reserved for the high-end server market creep down into the mainstream as the need arises and they are no longer cost-prohibitive. A few years ago, we'd be hard pressed to think of a valid reason to have dual NICs installed in a home computer, but times have changed. With U.S. broadband penetration reaching 42.85% according to one January 2004 study and multiple computers in single households now more common, you can find GbE controllers for as little as $15. Thus, having dual NICs installed in a single PC can be quite useful.

Some new high-end motherboards, such as the Chaintech 9CJS pictured here, have dual Ethernet controllers integrated onto the board.



Five Networking Tips For Mac OS X

by Sascha Segan

1 Configure OS X's built-in firewall. OS X comes with a robust firewall that can block outgoing/incoming connections. True geeks configure it from the command line using the ipfw command. To access highly technical details, type **man ipfw** in the Terminal. The rest of us use BrickHouse, which gives ipfw a GUI. At press time, the latest version was 1.2b12, which adds support for Rendezvous networking in Jaguar and Panther. Download it at brianhill.dyndns.org/betastuff.

2 Secure your AirPort network. If you're running a wireless network using an Apple AirPort hub, take several steps to lock down your network. Open Apple's AirPort Utility, go to Show All Settings, Access Control, and enter the MAC addresses of all the machines authorized to use your network. You can find a Mac's MAC in System Preferences, Network, and AirPort; it's the AirPort ID. Hide your network by going to Show All Settings, AirPort, and clicking Create A Closed Network. AirPort Extreme base stations can reduce their power, restricting access to a small physical radius. Click the Wireless Options button and select Transmitter Power. Finally, turn on network security by going to Name And Password and clicking the Change Wireless Security button. WPA Personal (available on AirPort Extreme base stations) is much better than WEP.

3 Access your desktop remotely and securely. VNC (Virtual Network Computing) is a free way to access your desktop from afar, but it's awfully insecure. Beef up your VNC desktop by tunneling it through SSH, the secure shell program. First, get a VNC server from www.redstonesoftware.com. On your server machine, go into System Preferences, Sharing, and turn Remote Login on. Open port 5900 on your server's firewall and start your VNC server. On your remote machine, type **ssh –L 5902:127.0.0.1:5900 *myserver.com***, where *myserver.com* is the name or IP address of your VNC server. Then launch your VNC client and configure it to open port 5902 on server 127.0.0.1.

4 Browse the Internet from a Bluetooth device. Your Mac has Bluetooth. Your handheld has Bluetooth. Your Mac has the Internet. To get the Internet onto your handheld, use OS X's built-in PPP server. Owners of Symbian OS devices should download the free Share2Blue2th AppleScript from 3650anda12inch.blogspot.com. Everybody else should try the scripts at www.technohappymeal.com/archives/000070.html, a blog that has suffered an awful attack of comment spamming. If you're really gutsy, you can write your own script. For tips, go to www.macosxhints.com and search for "Share an internet connection with a Bluetooth device."

5 Share your iTunes library across the Internet. Apple's iTunes 4.5 update killed many of the hacks that let you share iTunes libraries across the Internet, but Slim Devices' free SlimServer (www.slimdevices.com/su_downloads.html) has picked up much of the slack. Run the server software on your home PC, and you can play iTunes songs and playlists from afar. Both MP3 and AAC are supported, though music you buy from the iTunes music store isn't. Remember to open port 9000 on your network hub to let the music out.

An obvious benefit of having dual NICs in place is redundancy or failover protection. Should one controller fail, you can configure the machine to have the second controller take over. This may not be a necessity in most homes, but anyone running his own Web/FTP server or anyone who commonly accesses his PC from the road will appreciate having redundant network connections. When configured to work in tandem, dual NICs can also increase the overall throughput, but with virtually all residential broadband ISPs, the actual connection (usually hovering around 1Mb or less) would become a bottleneck well before a single NIC was taxed.

When used with the right operating system and software, such as IP Metrics' NIC Express, you can also configure dual NICs to load balanced network traffic between multiple controllers. Software can even detect problems on a network and reroute traffic as it becomes necessary, which can help alleviate certain bottlenecks or connection problems. Many high-end Ethernet controllers ship with similar software. Microsoft's server operating systems have load-balancing features built-in, for example.

Probably the most realistic use for dual NICs is to share an Internet connection and eliminate the need to purchase a separate router. You can configure a system with dual Ethernet controllers to act as a gateway to the Internet. For example, you can bridge the NICs together, with one connected to the Web and the other connected to a hub or switch, which in turn is connected to the other computers on the network. With this type of setup, users can install more secure firewalls to protect the network or install monitoring software to see where users are browsing.

Five Networking Tips For Linux

by Chad Denton

1 **Cheap router.** With Linux, an old PC, and a few NICs you can create a cheap firewall/router. Find technical information at the Netfilter/IPTables Project Homepage (www.netfilter.org/documentation). To get running quickly, download and install a preconfigured firewall script from the Web. (A Google search will turn up numerous scripts.) Otherwise, you can use graphical front-ends, such as Guarddog and Guidedog (www.simonzone.com). Guarddog lets you quickly create and modify a basic firewall. Guidedog lets you quickly configure the Linux kernel's routing capabilities.

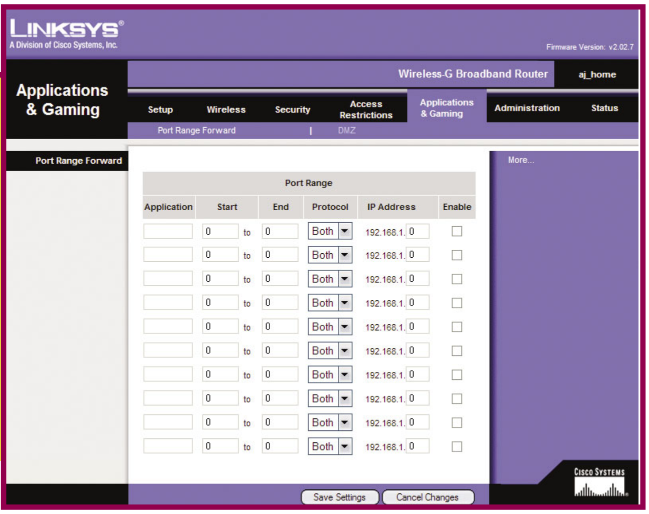
2 **Install via NFS.** If you've downloaded Linux installation files to one machine on your network, you can install Linux on other systems using NFS. The Linux NFS-HOWTO (nfs.sourceforge.net/nfs-howto) has the information to get started. Debian users can find more information about installing the latest distro via NFS at www.debian.org/releases/sta ble/i386/install. Instructions for installing Mandrake 9.0 via NFS are available at www.troubleshooters.com/linux/nfs_install.htm. (Red Hat 8.0 users will also find information here.) As of press time, Mandrake 10.0 documentation wasn't readily available, although you can find information at a local Mandrake FTP mirror (see the INSTALL.txt file). Most other distros support installation via NFS. Check your distro's documentation for more.

3 **Samba debugging.** To share files and printers with Windows machines on your network, you'll need to configure Samba. While flexible and stable, Samba can be difficult to properly configure. If Samba isn't working for you and you're looking for more information, increase Samba's log level. Open /etc/samba/smb.conf in your text editor and add the line log level **=3** to increase the amount of detail Samba records. (If the line already exists, change the value to 3.) A setting of 3 should work in most cases, but you can increase it to 10. Even at 3, Samba will record a lot of information, so you may want to reset the log level to 1 when you're finished debugging.

4 **Centrino Wi-Fi drivers.** Intel's work on Centrino Wi-Fi drivers is moving forward slowly but surely. Download the latest drivers for the Intel PRO/Wireless 2100 at ipw2100.sourceforge.net and PRO/Wireless 2200BG drivers at ipw2200.sourceforge.net. (Note that Intel currently has no plans to develop a driver for its PRO/Wireless 2100A card). Both drivers are in the early development phase and include only basic functionality. New users may find installing the drivers a bit difficult. You have to compile the source code from scratch and, in certain situations, install additional supporting software. See the documentation for each project for more.

5 **Communicating with Mac OS X.** Apple's OS X has a Unix core, so it's not surprising that OS X can communicate with Linux machines using NFS. NFS Manager ($18.71; www.bresink.de/osx/NFSManager.html) may be the easiest way to configure NFS on a Mac OS X system. Linux, however, also has a great deal of flexibility. Netatalk can take advantage of AppleTalk support in the Linux kernel to make your Linux system look like another Mac to Macintosh systems. You may be able to find Netatalk binary packages available for your distro or you can download the source code at sourceforge.net/project/showfiles.php?group_id=8642. More documentation and information is available at netatalk.sourceforge.net.

Low-Ping Gaming Goodness



Port Range

Application	Start		End	Protocol	IP Address	Enable
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐

Gaming On: These images show the port forwarding menu after opening the proper ports and forwarding the packets to our server's IP address. Remember to save your changes and test your Internet connection whenever altering your router's settings.

You have a fat pipe to the Internet, a killer gaming rig, a stack of the latest and greatest multiplayer games, and friends you're just itching to frag. What you don't have is a game server that can connect you all with adequately low-ping times. The fast servers are all full, and the ones that have some connections available are so laggy your broadband connection suddenly feels like dial-up. So, why not run your own dedicated game server? If you have the hardware, there are numerous benefits. Setting up your own dedicated server virtually guarantees a low-ping connection to a game server that's running only the maps and game styles you want, with exactly the number of bots you're looking for. Password-protect it and give your friends the right IP address or server name, and your clan (and only your clan) can get its game on at the drop of a hat.

There are some important things to consider before setting up a dedicated game server, however. First, don't even bother trying this with a dial-up connection. Without broadband, there isn't much point. Also, the machine you plan to use must meet the game's minimum requirements to work, and if the system is behind a firewall/router, you'll have to open some ports and forward them to the proper IP address on your network. This may sound a bit complicated, but the process is fairly straightforward and doesn't take much time. We had our router configured and server running in just a few minutes.

Step 1. The first thing to do is open up the game's help file or users guide and find which ports you need to open for the server to function correctly. Without opening the proper ports, the client machines can't send or receive game data. We used Unreal Tournament 2004 for this article, but the process should be very similar for about any current multiplayer game. After a little homework, we found that UT2004 requires the following ports to be opened and their packets forwarded to the game server:

Game port: 7777
Query port: 7778
GameSpy query port: 7787
Connection to the master server: 28902

Step 2. The LinkSys WRT54G broadband router we used assigned our server an internal IP address of 192.168.1.101. We logged into the router, accessed its Applications & Gaming menu, and selected the Port Range Forwarding section.

On this menu that we had to assign the ports that UT2004 needed to be forwarded to the server. The image labeled Gaming Off shows what the menu looked like before we made the changes. The Gaming On image is what the menu looked like after the port forwarding assignments were complete.

Step 3. Most broadband routers use NAT to hide your PC from the outside world. NAT simply assigns machines that are behind the router an internal unregistered IP address, usually in the 192.169.X.X range. Thus, you can use the single registered IP address your ISP assigns you to support multiple computers. When setting up a dedicated server, you may need to tweak some games (including UT2004) to make them run behind a router using NAT. We had to edit an entry in the server's UT2004.ini file for it to work properly. We opened the UT2004.ini file in Notepad and found the following entry:

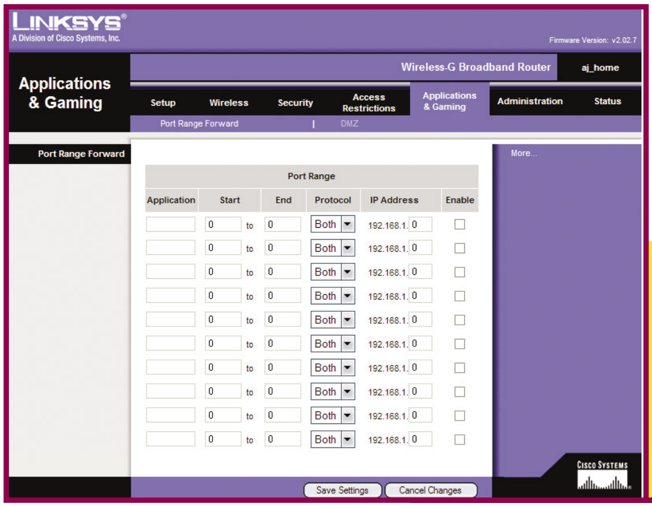
ServerBehindNAT=False

We changed this to:

ServerBehindNAT=True

We then saved our changes and were ready to fire up the server.

Step 4. You can launch the actual game server application several ways with UT2004, including by running the game and choosing Host Game from the main menu and setting the desired parameters from there. You can also run the server from the command line. Check your game's documentation for the correct method. With your server running, launch the game and check if your server is listed in the master list. If it is, you should be set. For more information on setting up a dedicated game server, check the support pages and message boards on the developer's Web site.



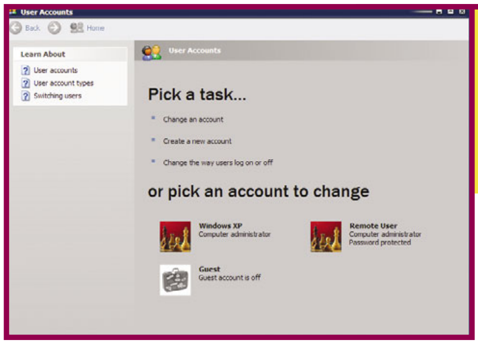
Port Range

Application	Start		End	Protocol	IP Address	Enable
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐
	0	to	0	Both	192.168.1. 0	☐

Gaming Off: When you first log into your router, the port forwarding menu will probably look something like this.

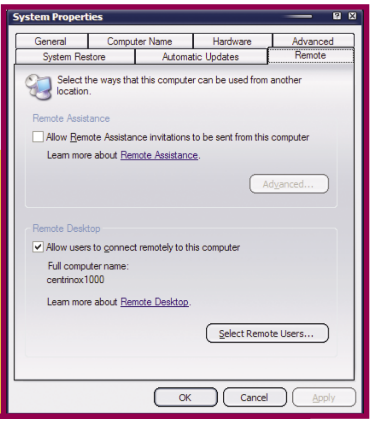
Remote Control Your PC

You're away from home and need to access a file on your desktop. Out of luck? No. Several tools will let you log into and control a computer remotely. Programs such as Symantec's pcAnywhere or Remotely Anywhere by 3am Labs let users securely connect to and control a remote PC. There are also some popular Web-based utilities, such as those at GoToMyPC.com.



Step 1. Go to Control Panel, double-click User Accounts, and create a user account to use with Remote Desktop. All local administrator accounts will work, as well, provided the account is password-protected.

WinXP Pro users can access the built in Remote Desktop, known as Terminal Services on Microsoft's server OSes. Before setting it up, there are some factors to consider. Remote Desktop has to redraw the screen on the client machine when changes are made on the remote PC, so consider broadband a must. You'll also need to know your IP address, which can be a bit hard to find if your system is behind a router. If your broadband modem is connected directly to your PC, however, you should be able to go to a command prompt (Start, Run, and type **cmd**) and run IPCONFIG to get your IP address. When using a router, however, you'll have to log into it and find your WAN address or external IP address.

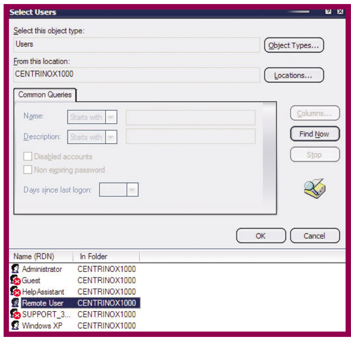


☐ Allow Remote Assistance invitations to be sent from this computer

☑ Allow users to connect remotely to this computer

Full computer name:
centrinox1000

Step 2. Right-click My Computer and select Properties. Click the Remote tab and check Allow Users To Remotely Connect To This Computer.



Select this object type:
Users

From this location:
CENTRINOX1000

Name (RDN)	In Folder
Administrator	CENTRINOX1000
Guest	CENTRINOX1000
HelpAssistant	CENTRINOX1000
Remote User	CENTRINOX1000
SUPPORT_3...	CENTRINOX1000
Windows XP	CENTRINOX1000

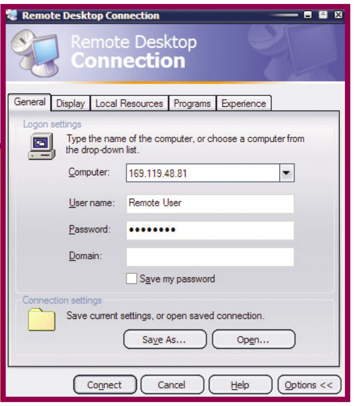
Step. 3. Click Select Remote Users and click Add. Click Advanced and then Find Now. (This will list all user accounts on the system.) Select the user account you want to use and click OK. Click OK again to close the Select Users dialog box. Click OK twice more to close the Remote Desktop Users and System Properties dialog boxes and you're done configuring.

A problem with many broadband providers is that your external IP address may be dynamic, meaning your IP address may be different each time you connect or may change at random intervals. If this is the case, you can be religious about checking your IP address daily or sign up for a service (try DynDNS.org or TZO.com) that will alias a dynamic IP address to a static hostname.

There are also firewall and NAT issues to contend with. When using WinXP's firewall, you need to select Remote Desktop under the Services tab in the Advanced Settings menu, otherwise a link can't be established. With a router using NAT or with more advanced firewall software, you need to open port 3389 for Remote Desktop to function.

You also need to properly configure the client machine to connect to the remote PC. With WinXP Pro, the Remote Desktop client software is installed by default. Open it by clicking Start, Accessories, Communications, and running Remote Desktop. If the client machine isn't running WinXP Pro, you can install it using a WinXP Pro CD or by downloading the Remote Desktop client from Microsoft's site. The client software will work on any 32-bit version of Windows.

For more, see the FAQ at: www.microsoft.com/windowsxp/remotedesktop/faq.asp.


Remote Desktop Connection
Remote Desktop
Connection
General
Display
Local Resources
Programs
Experience
Logon settings
Type the name of the computer, or choose a computer from the drop-down list.
Connection settings
Save current settings, or open saved connection.
Save As...
Open...
Connect
Cancel
Help
Options <<

Computer: 169.119.48.81

User name: Remote User

Password: •••••••••

Domain:

☐ Save my password

Step 4. Launch Remote Desktop Connection, input your IP address in the Computer field, enter your username and password, and click Connect. You should see your Desktop and have remote control.

Networking 101

With endless configuration possibilities, we couldn't possibly cover all of the uses for a home or small-office network in this article; volumes have been written on the subject. These tips and information, however, should give you a good start with your own projects. Having a shared network location to store files or having the ability to connect wirelessly to the Web is incredibly valuable and convenient. CPU

by Marco Chiappetta

BUILD YOUR NEXT-GEN NETWORK NOW

Getting To Know The Tools Of The Trade

1. Atheros AR5213A-00
2. Linksys PLUSB10
3. NVIDIA nForce3
4. SMC2870W repeater
5. SMC8505T

It's that dang video. Not many of us make a habit of copying 10GB folders across our home networks. Online gaming works fine on Fast Ethernet and so does streaming MP3s. But we saw the end of the road when we started playing with Windows XP Media Center Edition and apps like SnapStream's BeyondTV 3. Today, it's top-bitrate TV recordings. Tomorrow, it'll be on-demand movies and high-def content. Your Fast Ethernet LAN will creak under the strain, and it'll be time to upgrade.

Of course, once you clear that speed bump, you'll realize that you want to stream this HD video to two places in your house simultaneously while somebody else is listening to 5.1 Internet radio and you're tied up in a wireless deathmatch with the neighbor next door. This doesn't even count items such as the four security cam streams pumping into your server while you're asleep, backing up all of your PCs' data to a remote storage service, or maintaining half a dozen VoIP phone lines.

Today, this sort of network load is the domain of hobbyists, but in two or three years, such demands on the home LAN will be common. If you're ready to take the plunge and meet your bandwidth demons head-on, let's get started and see how to build you the best network possible.

Building The Gigabit Backbone

Gigabit Ethernet is a must. Most industry pundits agree it will be many years before we see 10Gbps networking in the home, much less have any need for it. Gigabit is the sweet spot for the foreseeable future.

The good news is that many motherboards on the market now come equipped with Gigabit LAN onboard. The bad news is that not all Gigabit adapters are created equal. NVIDIA drove this point home to us during its nForce3 250Gb chipset tour. With a high-end server tied to a client box, we saw firsthand that an Intel PRO/1000 MT PCI card turned in about 800Mbps of full-duplex throughput in NetIQ's Chariot network benchmark test. On an i875-based motherboard with Intel's highly regarded CSA architecture, we saw about 1,500Mbps, and the nForce3 250Gb slammed home 1,800Mbps. When you consider that the theoretical limit is 2,000Mbps, you can appreciate just how much variance there is in GbE network performance. Moreover, CPU utilization inversely correlates to these throughput numbers, meaning that the weaker your adapter, the harder the CPU is working, thus leaving it with fewer cycles for tasks such as MPEG encoding.

Note to notebook users: Currently, we know of no Gigabit PCMCIA-based adapters on the market. CardBus is a 32-bit 33MHz format, just like the PCI bus it sits on, so the supposed bandwidth limit for PC Card is 133MBps, while Gigabit Ethernet is 125MBps. However, despite the fact that GbE PC Cards are feasible, the market doesn't seem to be demanding them yet. Even integrated Gigabit only shows up on a handful of systems. Most of these are business units, such as HP's nc6000 or Dell's Latitude D800, although high-end consumer models, such as Alienware's Area-51M, are starting to join in.

If you don't have integrated Gigabit Ethernet, a 32-bit PCI adapter will run about $30 to $50. Gigabit cards for 64-bit PCI slots hover in the $80 to $120 range.

Switch upgrade. Once your systems are outfitted with GbE adapters, it's time to upgrade your switch. Now, we understand that for the sake of saving money, many users will want wireless routers with built-in switches. But consider that wireless standards change a lot faster than wired standards, and it's much less painful to replace an access point than a router. Between that and the fact that we're here to describe an ideal configuration, we're going to advocate going with a straight Gigabit switch. Besides, we have yet to see a Gigabit-enabled wireless router in the consumer market.

Instinct says to put all of your network gear next to your main PC—the more LEDs per square foot, the higher your score, right? However, today's routers and access points can all be configured via a browser window from anywhere on the network. It

D-Link DI-604

Linskys WRT54GS

may be comforting to have them near your desk, but it's absolutely unnecessary.

Ask yourself: Where will I want to play my high-bandwidth content? Plot the spot closest to the middle of those locations: That's your Ground Zero. That's where you want your switch, and this is why you often find new-construction homes with their structured wiring hubs located in a closet under the stairway, a spot usually close to the center of the main floor. Because all network lines lead back to the switch, you'll spend less money on cabling and ensure better signal integrity. According to Chuck Garner, president of Portland, Ore.,-based network installer Garner Electric, CAT 5/5e cabling starts to lose signal quality after about 600 feet. This generally isn't a problem in homes under 4,000 square feet, but it's something to keep in mind during your planning.

Next, consider planting a conventional four-port 10/100 wired router, such as D-Link's DI-604 ($45), between the broadband modem and the Gigabit switch. Obviously, this does nothing to impede throughput from the considerably slower broadband connection. Rather, it serves to supply an IP address to the Gigabit network behind it; provide lower speed jacks for slower devices, such as a print server or network-attached storage peripheral; and not allow any of those devices to drain bandwidth from the Gigabit switch(es).

Now you're ready to lay in the Gigabit gear. We sampled two eight-port Gigabit units: SMC's SMC8508TX ($180) and D-Link's DGS-1008D ($149). Both units are functionally very similar and support must-have features, such as store-and-forward switching for solid transmissions and the ability to dynamically switch to a half-duplex mode under heavy loads in order to prevent packet dropping. SMC's unit comes ready to rackmount, while D-Link includes materials for wall mounting. Desktop users may prefer D-Link's looks because, despite being larger, the switch places the status LEDs on the front and the ports in the back. SMC puts both LEDs and jacks in the front. This is great in a 19-inch rack but leaves a nasty snake pit on a desk.

If you need more than eight GbE ports, we suggest buying a secondary five- or eight-port switch to run in a daisy chain configuration. You only lose one port, which is far better than paying the $600 to $1,000 for a 16-port switch.

Catch Some Air

Unless you are fortunate or masochistic enough to run CAT 5e to every conceivable usage point in your home—including the back yard and living room couch—you're going to want to tack on a wireless AP of some sort. For basic LAN infrastructure, 802.11b is a plodding dinosaur. You want either of the 54Mbps descendants: 802.11a or 802.11g. You probably know that g is backward compatible with b because they both operate on the 2.4GHz radio band. The a format is a 5GHz technology that trails b/g in range but can exceed g in performance under the right conditions.

Because of its shorter wavelengths, 802.11a signals tend to break up more easily in the presence of obstacles, such as walls and floors. This usually gives g the edge in signal clarity unless you're in an open environment, such as a corporate cubicle field. However, we could drone on for pages complaining about all of the 2.4GHz network woes we've faced because of microwave ovens, cordless phones, and neighbors also running 2.4GHz networks. Nearly all of those interference problems vanish with 802.11a.

For maximum wireless speed, you want products that support some sort of "turbo" mode. These accelerated modes work by bonding channels. There are normally 13 channels in 802.11a, but this drops to five channels in turbo mode. While 802.11b/g sports 11 channels, many turbo implementations restrict you to channel 6, which is the most crowded.

Atheros and Broadcom are the two leading manufacturers of the wireless chips in today's consumer WLAN products. Atheros has its Super G technology (also compatible with 5GHz products), which advertises data rates of 108Mbps while simultaneously delivering "typical end-user throughput exceeding 60Mbps" after you figure in network overhead. Broadcom's Afterburner is an extension of its "54g" products. Interestingly, Afterburner uses a frame-bursting technique rather than channel bonding to obtain its performance increase. Afterburner was originally billed as a 125Mbps technology, but Buffalo Technology, which uses Broadcom's chips, says it most clearly: "When operating in High Speed Mode, this Wi-Fi device achieves an actual throughput of up to 34.1Mbps, which is the equivalent throughput of a system following 802.11g protocol and operating at a signaling rate of 125Mbps."

"One of the things that happens when you bring a b node into a network is you knock your g back down to b throughput levels," warns Mani Dhillon, product marketing manager for Linksys. "That's just how 802.11 works. So you'll get about 7Mbps on your g card and about 3Mbps on your b card. With our SpeedBooster [Linksys' branding of Afterburner], though, your g performance stays pretty high in mixed-mode situations."

Linksys says SpeedBooster will increase your 802.11g throughput by up to 35%. To test this, we took the company's WRT54GS b/g router and WPC54GS b/g PC Card for a spin. Our throughput numbers when running the client and router in the same room with no encryption enabled floated between 34Mbps and 36Mbps. With three or four walls between them, throughput dropped into the low 20s, but that's still pretty good considering we often see a much heavier performance drop from turbo-enabled routers working across obstructed distances.

We didn't receive NETGEAR's latest Super G products in time to review for this story, but word on the street has it that best-condition scenarios show Super G averaging around 45Mbps. So *if* you can keep all 802.11b influences away from your network and *if* all of your network adapters are running with Super G enabled, then Broadcom wins. Under real-life conditions, though, it's probably a push. Given our heinous experience with neighborly interference, we're more inclined to pick an Afterburner-based product. That said, NETGEAR claims that Super G can deliver up to four times the reception range of 802.11b. We'd like to see how well this does through walls and floors before hailing it an extended-range savior.

In fact, extended range is one of the key challenges in a WLAN. A predictable arrangement is that you have Gigabit wiring in your office and perhaps the room next to it and then cover the rest of the house with an access point. Unfortunately, you'll find most homes end up with wireless dead spots, especially in corners. Assuming you're retrofitting and weren't able to string an AP into the ceiling at the far end of your house, there are three main ways to deal with this:

SMC SMCHMANT-6 directional antenna

1 **Use a repeater.** A repeater is a wireless access point that you power up farther out on your WLAN. Local clients home in on the strong signal of your repeater, and then the repeater forwards your communication back to another AP closer to the switch. One good example is SMC's SMC2870W, an 802.11b/g device that serves as a bridge, access point, and repeater. The catch is that you take a roughly 50% performance hit with each successive repeater in a WLAN chain, so you probably only want to use one.

2 **Use amplified antennas.** SMC sells two booster antennas, an omnidirectional 4dBi unit and a 6dBi directional one. Either of these replaces the removable antenna on your router or AP. We tried these boosted antennas with the SMC2532W-B PC Card, which draws up to 200 milliwatts and yields, according to SMC, three times greater transmission range. (*NOTE: You want boosted adapters at each end of the wireless connection. Having a router be able to reach a client doesn't do any good if the client can't reach back.*) With the omnidirectional antenna and boosted PC Card, every known dead spot in our house vanished. We slapped the directional unit onto our router, pointed it out our second story window, and were stunned to still be able to keep a connection down the street and across the adjacent park—nearly three blocks away. We might have gone farther, but houses forced us to lose line of sight, whereupon the connection immediately dropped. We achieved this feat on channel 11; we lost the connection on channel 6 after about two blocks.

3 **Switch to HomePlug adapters.** The glory of HomePlug is that you just stick the adapter in a power outlet, run a cable from your computer to the adapter, and you're networked. Seriously, it's about that easy. Anywhere you've got an outlet, there's a network jack waiting. Linksys sent us a couple of PLUSB10 PowerLine USB Adapters ($60 ESP). These have the advantage of working with any PC regardless of whether it has a NIC installed, although we only obtained speeds in the 3Mbps to 4Mbps range. Most HomePlug adapters feature Ethernet ports instead (better for game consoles) and perform in the 5Mbps to 6Mbps range. The theoretical limit on current HomePlug products is 14Mbps, so it's a valid alternative to Wi-Fi. Just be warned that most homes have two major power circuits running into them, and HomePlug adapters will only work on a common circuit. It's possible that you could have adapters within 10 feet of each other not be able to communicate; this is the leading reason network vendors have been quiet about the technology.

Adjust As Needed

Perhaps you noticed by now that many of these non-Gigabit options aren't exactly optimized for HDTV streaming. True enough. Even with an 802.11a or 802.11g router in a turbo mode, it would be a stretch to get two HD streams running decently across a wireless connection. You'll probably only be able to handle one stream, especially if you're in a noisy RF environment. So that's why you improvise. Perhaps you can't fit two streams onto one AP, but how about two APs, each with its own ID? That's another $80 or so, but if the range will reach, it sure beats wading through an attic filled with insulation and punching holes in your walls.

The trick is to keep your network modular. We know 802.11n will be here in a couple of years to blow all of these a/b/g concerns out of the water, so don't commit your LAN's core to an integrated router unless you're prepared to pay (literally) for the consequences.

Also keep in mind that stringing wire doesn't have to be done overnight. If you're new to installing CAT 5, pick an easy, nearby room to help build your confidence and knowledge. If you're more the hands-off type, our buddy Chuck at Garner Electric says that paying someone like himself to retrofit a 2,500 square foot house with a structured wiring panel (including phone and video modules) and four or five panel drops around the building will cost $1,500 to $2,000.

With your next-gen network in place, you'll be able to finally enjoy your choicest multimedia content the way it was meant to be enjoyed: anywhere you want. CPU

---

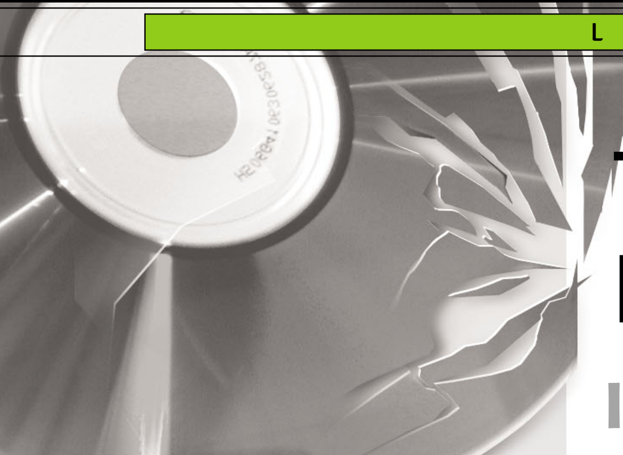
by William Van Winkle

Stringing the cable for wireless access in your home can be intimidating, sometimes even infuriating. Check out www.cpumag.com/cpujul04/netperipherals for our pointers on getting the job done right and our "Digital Devices" section.

Introducing the AMD Athlon™ 64 FX processor. Take your system to extremes.

Double the data path from 32- to 64-bit and you more than double the thrill factor. Uninterrupted, ear-splitting, streaming audio and rich, razor sharp video make your pad a launching pad. What's more, you get all the power you need to edit, mix, and model your own digital creations with memory to spare. Prepare to blow minds. Get a dose of the AMD Athlon 64 FX edge at www.amd.com/amdathlon64fx

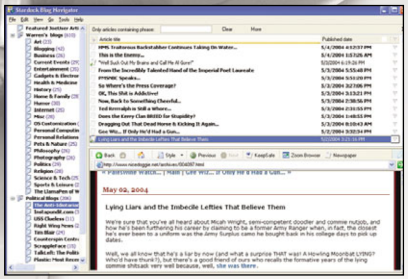
© 2003 Advanced Micro Devices, Inc. All rights reserved. AMD, the AMD Arrow logo, AMD Athlon, and combinations thereof are trademarks of Advanced Micro Devices, Inc.



by Warren Ernst

The Bleeding Edge Of Software

Inside The World Of Betas



Article title	Published date
RMS Traitorous Backstabber Continues Taking On Water...	5/4/2004 4:12:37 PM
This is the Enemy...	5/4/2004 1:57:26 AM
"Well Suck Out My Brains and Call Me Al Gore!"	5/3/2004 6:19:26 PM
From the Incredibly Talented Hand of the Imperial Poet Laureate	5/3/2004 5:55:48 PM
PMSNBC Speaks...	5/3/2004 5:51:20 PM
So Where's the Press Coverage?	5/3/2004 3:27:06 PM
OK, This Shit is Addictive!	5/3/2004 3:13:21 PM
Now, Back to Something Cheerful...	5/3/2004 2:38:56 PM
Ted Rrrraalph is Still a Whore...	5/3/2004 2:31:55 PM
Does the Kerry Clan BREED for Stupidity?	5/3/2004 1:48:55 PM
Dragging Out That Dead Horse & Kicking It Again...	5/3/2004 8:10:43 AM
Gee Wiz... If Only He'd Had a Gun...	5/2/2004 3:32:34 PM
Lying Liars and the Imbecile Lefties That Believe Them	5/2/2004 3:21:16 PM

« Paleswine Watch... | Main | Gee Wiz... If Only He'd Had a Gun... »

May 02, 2004

Lying Liars and the Imbecile Lefties That Believe Them

We're sure that you've all heard about Micah Wright, semi-competent doodler and commie nutjob, and how he's been furthering his career by claiming to be a former Army Ranger when, in fact, the closest he's ever been to a uniform was the Army Surplus camo he bought back in his college days to pick up dates.

Well, we all know that he's a liar by now (and what a surprise THAT was! A Howling Moonbat LYING? Who'd have thunk?!), but there's a good friend of ours who recalls the formative years of the lying commie shitsack very well because, well, she was there.

Official product name: Blog Navigator
Version # previewed: 0.90 Beta
Publisher: StarDock
Developer and URL: Stardock; www.stardock.com/products/blognavigator
ETA: Q3 2004
Why you should care: Reading hundreds of blogs has never been easier.

Blog Navigator 0.90 Beta

The Web browser has become a jack-of-all-trades app, but keeping up with blogs with one is like trying to run an email list with Webmail: It works, but it gets cumbersome real fast. Blog Navigator comes from Stardock, known best for its WindowBlinds and other GUI enhancements. Perhaps because of this, BN looks and feels slick, with a well-thought-out GUI with a nice feature set.

Let's get to the bad first. BN only works with Windows 2000/XP, and it costs $20. That price does include free updates to version 1.99, and honestly, there aren't many free blog readers taking the world by storm. Amazingly, this is it for the bad.

The good takes longer to cover. BN works quickly, scanning every 10 minutes by default in the background for new articles in subscribed blogs. Adding new blogs is fast because BN automatically locates RSS feeds at URLs to point it at and populates its new article lists in the blink of an eye.

BN's display modes include a hierarchical tree view, Outlook-style summary, Preview, Content, and Newspaper view, which combines all blog articles in a current folder into one page. Clicking a blog entry can open an external IE window, preview pane, or tab with the full Web page the blog is on. BN has a direct hook to the IE rendering engine, so pages don't look messed up when viewing them internally.

Blogs are generally transient works, but BN doesn't force you to print what you want to save for future reference. Options include an internal basket for permanently storing entries or exporting to MHT page archive files for use in other apps. BN looks to be another success for StarDock. ▲

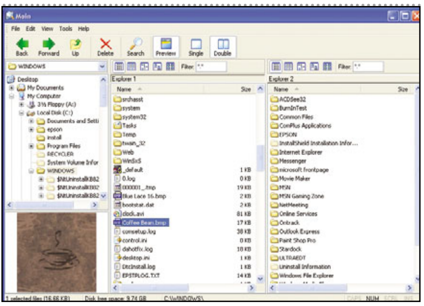
Windows File Explorer 0.5.3 Beta

Windows File Explorer from FreeSoft Labs is a good alternative to Windows Explorer, and as the company name suggests, the program is free.

One of the biggest annoyances with Windows Explorer results when you want to copy folders and files into another folder. Usually you have to open two instances of the program to drag and drop the data. Most WE alternatives, including WFE, provide two panes for viewing two folders or drives so you can drag and drop items within just one window.

WFE also offers a built-in thumbnail viewer. Clicking a single file in either pane displays it in the Preview pane. There's also a File Filter field atop each pane, so displaying all JPEG or DOC files is a snap. The System pop-up menu still works in WFE, so utilities that work in the WE pop-up menu work in WFE, too. This is probably a good thing because there aren't many more features in WFE, at least for now.

WFE's future feature list is ambitious, with plans for editing and previewing INI/TXT files and tools for internal compression, multiple renaming, file splitting/rejoining, and directory printing tools. When these are added, WFE will have the credentials to compete with the best of the alternative file explorers. For now, if split-pane file manipulation is all you need and you want it free, WFE is for you. ▲



Name	Size
srchasst	
system	
system32	
Tasks	
Temp	
twain_32	
Web	
WinSxS	
_default	1 KB
0.log	0 KB
000001_.tmp	19 KB
Blue Lace 16.bmp	2 KB
bootstat.dat	2 KB
clock.avi	81 KB
Coffee Bean.bmp	17 KB
comsetup.log	38 KB
control.ini	0 KB
dahotfix.log	10 KB
desktop.ini	1 KB
DtcInstall.log	1 KB
EPSTPLOG.TXT	14 KB

Name	Size
ACDSee32	
BurnInTest	
Common Files	
ComPlus Applications	
EPSON	
InstallShield Installation Infor...	
Internet Explorer	
Messenger	
microsoft frontpage	
Movie Maker	
MSN	
MSN Gaming Zone	
NetMeeting	
Online Services	
Ontrack	
Outlook Express	
Paint Shop Pro	
Stardock	
ULTRAEDT	
Uninstall Information	
Windows File Explorer	

1 selected files (16.66 KB) Disk free space: 9.74 GB C:\WINDOWS\ NUM

Official product name: Windows File Explorer
Version # previewed: 0.5.3 Beta
Publisher: FreeSoft Labs
Developer and URL: FreeSoft Labs; www.freesoftlabs.com
ETA: Q4 2004
Why you should care: Free, functional Windows Explorer alternatives are always a good thing.

Powermarks 3.5 beta 352

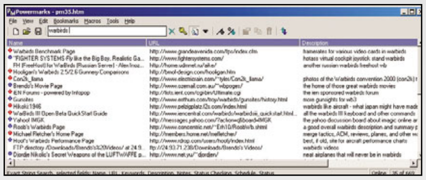
You probably access your list of stored Web site addresses every day via Bookmarks, Favorites, or whatever you call them. It's a shame those addresses aren't easily portable between Web browsers, syncable between computers, or easily searchable. Well, with Powermarks ($24.95), all that is possible.

PM is a standalone bookmark manager for Windows that does away with folders that can become more disorganized with time. Instead, you save Web site addresses in a single pool. As you add addresses, you can add plain-English notes and keywords. Everything you type, plus the site's name and URL, are then fully searchable. In fact, PM has an instant text filter. As you type a word or words, all nonmatching addresses disappear from your list. The app also tracks the addresses you call up regularly and goes online to verify URLs. After you use PM a few minutes, you'll wonder how you ever sorted through hundreds (or thousands) of addresses before.

PM can import addresses directly from Netscape/Mozilla, IE, and Opera, plus import various formats of text files filled with URLs and site names. PM won't import sites already within its database, so there are no duplications, and through repeated importing among different machines, you can maintain a single, standardized address list. Registering the product hooks you up with an online address syncing service.

This beta addresses problems associated with alternative Web browsers that usually have a tabbed interface and perhaps an API that aren't like mainstream browsers. In addition, this beta has a universal (if slightly cumbersome) method of adding an address directly from a browser that doesn't respond to PM's own Add Bookmark command.

The beta was rock solid and polished, and given its age, I wonder why the additions haven't been folded into the main version. I didn't have a single problem with it, and I'm a longtime user. ▲



Official product name: Powermarks
Version # previewed: 3.5 beta 352
Publisher: Kaylon Technologies
Developer and URL: Kaylon Technologies; www.kaylon.com
ETA: Q3 2004
Why you should care: There's no better universal bookmark manager anywhere.

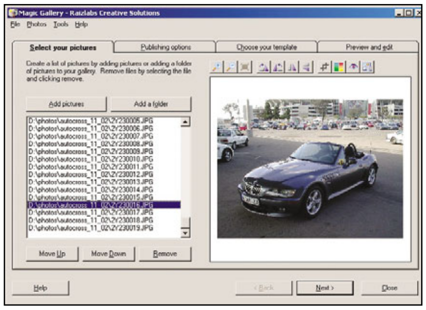
Magic Gallery 4.0 Beta

One of the advantages of having a digital camera is sharing photos with friends without having to pay for prints. One of best ways to do this is making an online photo album complete with fast-loading thumbnails for browsing and full-size, high-resolution files for printing and viewing details. A few programs automate the tedious job of resizing photos and making HTML pages to link everything together, but Magic Gallery ($28) is among the better ones, combining speed, ease, features, and superior output.

Like most automated thumbnail generators, MG takes a folder of files, displays a set of HTML templates that show you what your album will look like, lets you select one, and then gets to work. Thumbnail resizing and HTML file creation are handled automatically and are copied to a folder on your hard drive or sent to a Web site. MG offers several HTML templates and provides a link to a Web site with many more.

One of the program's templates includes a direct link to Shutterfly, so viewers can order their own prints via the online photo service. The same template also offers viewers an opportunity to email others with your photos. Both features work regardless of the server you use to host your photos.

The program has numerous tools to modify and enhance photos, including a red-eye reducer, a color adjustment tool, and image rotation and cropping. There's also a fantastic watermark feature, which adds either ghosted text or a ghosted image to each photo. These modifications don't affect your original image files, so you edit or add watermarks that are only for the online album. MG also supports TWAIN, letting you grab photos directly from a camera or scanner. ▲



Create a list of pictures by adding pictures or adding a folder of pictures to your gallery. Remove files by selecting the file and clicking remove.

D:\photos\autocross_11_02\2Y230005.JPG
D:\photos\autocross_11_02\2Y230006.JPG
D:\photos\autocross_11_02\2Y230007.JPG
D:\photos\autocross_11_02\2Y230008.JPG
D:\photos\autocross_11_02\2Y230009.JPG
D:\photos\autocross_11_02\2Y230010.JPG
D:\photos\autocross_11_02\2Y230011.JPG
D:\photos\autocross_11_02\2Y230012.JPG
D:\photos\autocross_11_02\2Y230013.JPG
D:\photos\autocross_11_02\2Y230014.JPG
D:\photos\autocross_11_02\2Y230015.JPG
D:\photos\autocross_11_02\2Y230016.JPG
D:\photos\autocross_11_02\2Y230017.JPG
D:\photos\autocross_11_02\2Y230018.JPG
D:\photos\autocross_11_02\2Y230019.JPG

Official product name: Magic Gallery
Version # previewed: 4.0 Beta
Publisher: Raizlabs
Developer and URL: Raizlabs; www.raizlabs.com
ETA: Q2 2004
Why you should care: Instant online thumbnails, who wouldn't want that?

Send Us Your Betas: Know of software in the beta stage that's deserving of some attention? Let us know. We'll take a look at it and possibly give it a go-round. Send your prospects to bleedingedge@cpumag.com.

UP TO SPEED

Upgrades That'll Keep You Humming Along

Multimedia fans get new toys this month, with Apple releasing a major upgrade for iTunes software and Alias upgrading Maya, the film and game animators' tool of choice for 3D rendering. Before downloading those goodies, however, focus on the important stuff, such as Microsoft's substantial security updates.

Updates

CloneDVD 2.0.8.4

This update for the DVD copier removes Unicode support for volume names and fixes UDF mastering problems.

Get it at: www.elby.ch

Core Media Player 4.0 (beta)

Previously known as PowerDivX, this AV player and organizer gets bug fixes, better DVD functionality, a logarithmic volume control, and expanded codec support and controls.

Get it at: www.corecoded.com

EarthBrowser 2.02

This real-time model of earth lets you point and click around our planet's surface, registering the current weather, sun position, earthquake and volcano activity, and more. You can even click into Web cams around the world. This update corrects previous errors and a bug experienced when importing settings.

Get it at: www.earthbrowser.com

iTunes 4.5

This major upgrade of Apple's music download software and player adds iMix for publishing playlists, a jewel box label maker, playlists from radio stations, integrated movie trailers and music videos, and conversion of WMA to AAC.

Get it at: www.apple.com

Maya Complete 6\Maya Unlimited 6

This update has improved modeling of hair, fur, and cloth; speed improvements in the Smooth Proxy tool; and up to 50% faster perfor mance on Mac OS X systems. Better integration with Adobe Photoshop and a built-in Web browser are also included.

Get it at: www.alias.com

Mozilla Thunderbird for Windows 0.6

Designed as a standalone email client that interacts well with the Mozilla browser, Thunderbird now has a Windows installer and better spam control settings.

Get it at: www.mozilla.org

Nero Burning ROM 6.3.1.10

The venerable burner software adds support for more recent recorders and fixes previous bugs involving DVD copying.

Get it at: www.ahead.de

Windows NT/2000/XP/Server 2003 Security Updates

Microsoft is now issuing monthly patches and updates to fix security and other issues in its OSes. The April updates are among the most far-reaching set of patches, with more than 14 flaws patched. Use the update features within each OS to access the patches or go to www.microsoft.com/technet/security/current.aspx for the latest security bulletins and links to updates.

Get it at: www.microsoft.com

Stuffit Deluxe 8.5

This file backup/compression utility gets a scheduler for automated backups, plus a Super Search function that can scour compressed files on hard drives and CD\DVDs for data strings or file names.

Get it at: www.aladdinsys.com

Driver Bay

Codecs Lite 1.4

This compilation of video codecs lets you decode most common digital video and audio formats. This version includes easier installation and the latest builds of XviD, ffdshow, AC3Filter, DivX, and MP3 codecs.

Get it at: theorica.click-now.net/codecs.htm

iPod Update 2004-04-28

This update for iPods/iPod minis makes the music players compatible with iTunes 4.5 software, improves playback performance, and supports Apple Lossless Encoder.

Get it at: www.apple.com

NVIDIA ForceWare 57.30 for Windows XP 64-Bit Edition for Extended Systems (Beta)

NVIDIA throws its support behind emerging 64-bit PC systems with these beta drivers that support DirectX9 and OpenGL 1.5. The bundle includes nView 3.5 for managing multiple displays, a pop-up blocker for IE, and support for custom game and application profiles.

Get it at: www.nvidia.com

Omega NVIDIA Drivers 1.5303

These tweaked versions of the GeForce 53.03 drivers are optimized to balance image quality and speed, especially in games. This release adds new resolution options and some support for notebooks running GeForce Go chipsets.

Get it at: www.omegacorner.com

Thrustmaster Force Feedback Drivers 10.0.3

Thrustmaster introduces a unified driver for most of its force-feedback devices, including F1 and Enzo racing wheels, Firestorm gamepads, and Top Gun Fox 2 Pro Shock joysticks. There's also improved performance in Colin Mc Rae 4 and Toca Race Driver 2.

Get it at: www.thrustmaster.com

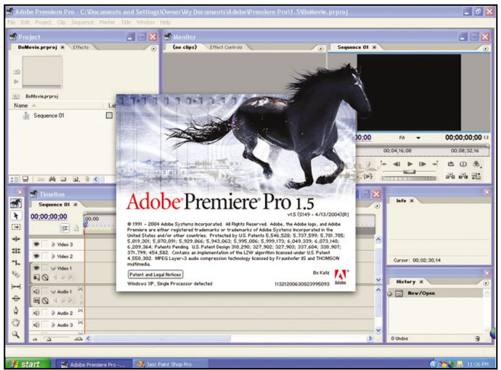
by Steve Smith

From The Amateur To Pro

Video-Editing Apps That Offer The Basics & Beyond

Home movies may have the notorious reputation for being dull, but they don't have to be. With an ordinary personal computer and a video-editing program, you can trim the boring parts out of a home movie, add a soundtrack, and include fancy titles, transitions, and visual effects.

Basically, video editing means importing video, still pictures, and audio files into your computer, rearranging and editing them, and then saving the final edited version back to your hard drive, CD or DVD, or a digital video camera.



Premiere Pro 1.5
$699
Abobe
www.adobe.com
CPU CPU CPU CPU

The price and performance of video-editing programs varies from free and simple to complicated and expensive. Fortunately, there are enough video-editing applications available that you can find the one that meets your needs at a price that you can afford.

To test the programs, we used a Sony notebook running a 900MHz AMD Duron processor with 128MB of RAM and a Compaq desktop with a 2.4GHz Pentium 4 with 512MB of RAM.

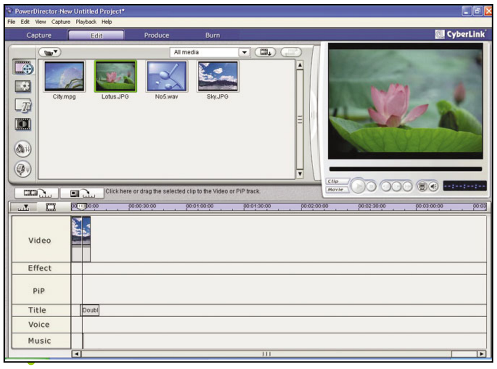
Adobe Premiere Pro 1.5

If you're an aspiring filmmaker, Premiere Pro offers all the basic video-editing features and a whole lot more. For example, editing video is a common task, but it can be time-consuming because you often need to insert a film clip and trim the surrounding video clips around it. Premiere Pro simplifies this by combining multiple steps into single commands.

For example, a ripple edit can insert and trim one part of an existing video clip while a slip edit lets you insert and trim three clips (the inserted clip and the two surrounding ones) all at the same time. Besides offering a large selection of different transitions, Premiere Pro also lets you customize the initial and final appearance of each transition, change the orientation of the transition's appearance, and modify the colors during the transition.

If you film two scenes at different times, you may notice color variations between them. To correct this, Premiere Pro lets you view two different frames and match their colors so they appear as if they were shot under identical lighting conditions. While most video-editing programs let you type text and change font or font styles, Premiere Pro goes a step further, giving you a pen tool (similar to Adobe's Illustrator) to draw lines and adjust individual letters.

When you're burning a video to disc, Premiere Pro can calculate the maximum bit rate that can fit on the disc, thus improving image quality. The program can also burn multiple copies of your video, prompting you to insert a new disc each time.



PowerDirector 3
$89.95
CyberLink
www.gocyberlink.com
CPU CPU CPU

Premiere Pro isn't easy to learn, but Adobe does offer an optional Expert Support service, which is $39 per call or $159 a year for unlimited calls. At a price ($699) that compares to what inexpensive desktop computers cost, Premiere Pro is definitely aimed at professionals, and you will need Windows XP to run it. Despite this, the app is the program you want for absolute control over your video.

CyberLink PowerDirector 3

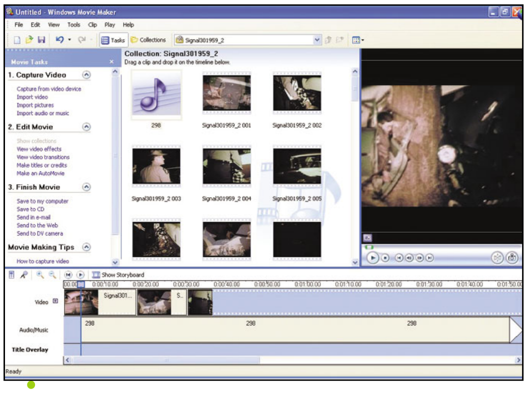
Some users may want to create dazzling Hollywood-style special effects, but most of us just want to touch up our home videos and make them look more presentable without wasting much time. If you fall into the latter category, PowerDirector 3 may be the video editor for you.

Besides letting you trim, combine, or rearrange a video, PowerDirector lets you correct colors that appear washed out or faded. For more interesting effects, the app can also display one video in a tiny screen that appears on top of another video. This lets you create movies where the main action fills up the entire screen

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

while in a corner of the screen another video plays simultaneously, perhaps showing a person using sign language.

To add sound, PowerDirector can rip tracks from an audio CD or record sound directly from a microphone. Because audio files won't always fill up the exact amount of time your video plays, PowerDirector lets you stretch or shrink your audio file so there's no dead air at the start or end of your video.



Windows Movie Maker 2
Free
Microsoft
www.microsoft.com

When you're ready to save your video to your hard drive or CD/DVD, PowerDirector painlessly guides you through the process. For added convenience, it also offers a Burn-To-Disc feature that lets you burn a CD/DVD directly from your digital video camera without going through the intermediary step of saving the digital video to your hard drive first.

Combined with its low price ($89.95), generous video-editing features, low system requirements (it ran fine on a notebook with a 900MHz AMD Duron processor and 128MB of RAM), and intuitive user interface, PowerDirector is perfect for those who want to create presentable videos quickly and easily. The program runs on Win98/Me/2000/XP.

Microsoft Windows Movie Maker 2

WinXP comes with a free copy of Windows Movie Maker, but you'll have to download a free update for version 2 (www.microsoft.com/windowsXP/moviemaker/downloads/moviemaker2.asp). You won't get a printed manual, but the UI displays the three basic steps for editing video, so all you have to do is click each step you want to accomplish, such as importing a video, and the program explains what to do next.

To make editing even easier, you can use the AutoMovie feature, which can automatically modify your video in different visual styles, such as fast cuts used in music videos or an aged appearance as if your video had been filmed decades ago.

Movie Maker offers basic features that let you split, combine, and trim video parts. You can also add titles, visual transitions between scenes, and create visual effects, such as turning video from color to black and white. When you're done editing, you can save your video to your hard drive, CD, as a compressed email attachment, or as a streaming video for posting on a Web site.

Movie Maker is good for anyone who wants a simple program that gets the job done. If you want to burn to DVD, modify video scenes, or save your video in different file formats, however, you'll have to look elsewhere. The app's free price makes it a great way to learn about video editing and discover what additional features you might need.

Pinnacle Systems Studio 9

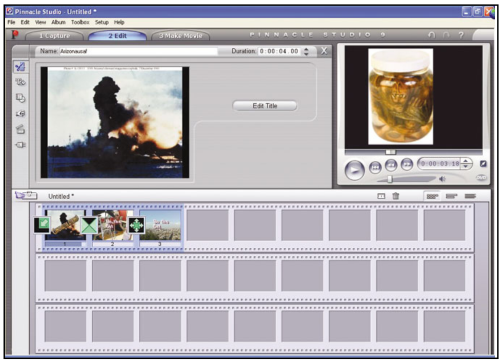
Pinnacle Studio offers a wealth of different transitions, titles, and sound effects (machine guns firing, birds chirping, crowds rioting, etc.) that you can add to your videos, plus special effects that can make your video appear as if through stained glass or a strobe light. The program also has several cleaning effects to stabilize jerky video or correct dark or washed out colors.

A SmartMovie feature lets you quickly turn video clips into a music video. If you don't have an audio file stored on your hard drive, the program can rip one from an audio CD. It also has a huge library of different sound files you can alter, including variations of jazz, rock, and new age.

For more flexibility, the program also includes an audio editor so you can remove extraneous noise, such as the wind, from the audio portion of your video. You can also use the app's equalizer to adjust and balance sound. The audio editor offers a Karaoke filter to strip away vocals from a song, a Grungelizer to add static and noise (such as radio static), and a Reverb effect for adding an echo.

The UI provides helpful guidance for editing video with three tabs clearly labeled 1. Capture, 2. Edit, and 3. Make Movie. Clicking a tab displays different options, so you'll only see those commands relevant to the task at hand. For basic video editing, Studio 9 displays oversized controls, dual windows that show the beginning and end of a clip, and the duration of a clip, so you can accurately measure where you want to trim, split, or insert another video.

With its massive library of AV effects and easy-to-use features for editing and correcting video and audio, Studio 9 should satisfy the needs of everyone from the novice who just wants to edit a home movie to the die-hard user who wants to control almost every aspect. The program works with Win98/Me/2000/XP.


Pinnacle Studio - Untitled *
File Edit View Album Toolbox Setup Help
1 Capture
2 Edit
3 Make Movie
PINNACLE STUDIO 9
Edit Title
Untitled *

Studio 9
$99.99
Pinnacle Systems
www.pinnaclesys.com

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

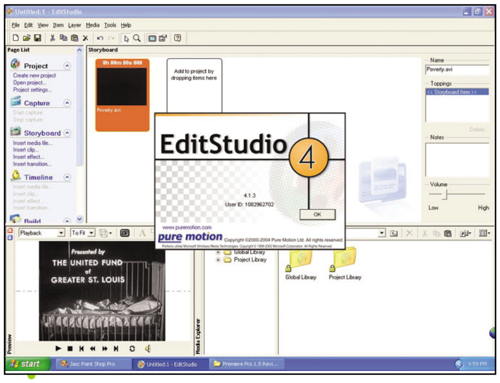
Pure Motion EditStudio 4

Unlike most video-editing programs, EditStudio lacks an integrated CD/DVD burning app, so you can't burn an edited video to a disc unless you already own a separate CD/DVD burning app.

Beyond that omission, EditStudio offers the standard video-editing features, plus a few welcome additions, such as a batch capture ability. Batch capturing lets you mark different start and end times of a digital videotape. EditStudio then automatically imports and organizes the video with no further direction from you.

When you add an audio file to your video, EditStudio displays the volume level as a single line called an Audio Rubber Band. By dragging the rubber band up or down in different places, you can selectively raise or lower the volume within different parts of your movie.

For visual effects, EditStudio offers keyframes, which lets you alter the brightness or create simple animation using selected scenes from your video. For example, if your video shows a politician walking to a podium, you could brighten the scene (keyframe) of the politician just as he reaches the podium. Then when your video plays, the politician will suddenly seem brighter than the rest of your video, emphasizing that part of your video.

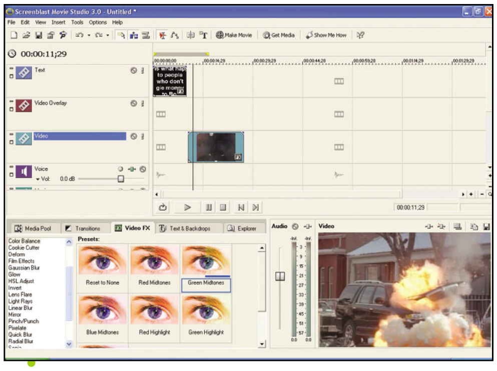


EditStudio 4
$100
Pure Motion
www.puremotion.com

You can download a trial version of the program to see exactly how it might work with your own videos. EditStudio isn't the most powerful video-editing program, but if you've outgrown Windows Movie Maker, EditStudio offers features you might want. It works with Win98/Me/2000/XP.

Sony Screenblast Movie Studio 3.0

Screenblast Movie Studio provides an excellent manual that not only defines technical terms, such as S-VHS and NTSC Analog, but also provides photographs that display what a 6-pin FireWire connector and component video jack look like. By teaching you what different cable connectors and ports look like, the manual helps you transfer video from your video camera or TV into your computer as painlessly as possible.



Screenblast Movie Studio 3.0
$99.95
Sony
www.screenblast.com

Once you've gotten past the technical hardware details of transferring video, Movie Studio provides tutorials on how to create various special effects. To further spice up your movies, you can download and use free video clips, such as a truck exploding or a picture of the earth as seen from outer space.

For visual effects, Movie Studio offers a zoom and pan feature. So if you have an image of the Grand Canyon, Movie Studio can initially show the ground near the edge of a cliff, zoom in to show the cliff edge, and then suddenly zoom out to show the entire Grand Canyon. By panning and zooming around parts of an image, Movie Studio can turn ordinary scenes into dynamic ones.

Movie Studio also offers a Chroma Key filter, which lets you take video of one subject and superimpose it over another. For example, you can take a video of a boy jumping off a chair, strip away the surroundings, and superimpose the image over video of Niagara Falls so it appears as if the boy is jumping off the edge.

To distribute your movies, the program can output to a variety of file formats, including QuickTime, Real Media, and Macromedia Flash. You can also upload video free to Screenblast.com for others to enjoy.

One major problem with Movie Studio is that you must register over the Internet before you can even use the program. If you don't have an initial Internet connection, Movie Studio refuses to run, even if you have purchased a legitimate copy and typed in a valid registration code. Aside from this hassle, this is a fine app for those who want to give their home movies a Hollywood-style makeover. With its helpful manual and library of free AV files, Movie Studio can help anyone turn her home movies into minor Hollywood masterpieces. The app runs on Win98/Me/2000/XP.

Which One Should You Use?

If you're running WinXP, start with Windows Movie Maker to see how video editing works. If you need more features and your computer has a slow processor with little RAM, Screenblast Movie Studio and PowerDirector run comfortably within limited system resources. EditStudio and Pinnacle Studio are better suited for computers with faster processors and at least 256MB of RAM running under WinXP. Once you graduate from amateur to professional video editing, nothing can touch the power (or price) of Adobe's Premiere Pro. ▲

by Wallace Wang

CPU Ranking: 0 = Absolutely Worthless 2.5 = Absolutely Average 5 = Absolutely Perfect

321 Studios GamesXCopy 9

Since cutting its teeth on DVD Copy Plus in 2002, 321 Studios has released a slew of backup utilities for recovering scratched audio CDs, resurrecting accidentally deleted files on hard drives, and converting old home video into DVD movies.

The company also sells GamesXCopy, designed to duplicate install discs and either copy them to your hard drive or back them up to CD. Most game publishers use copy protection to foil backup utilities, though. Although GamesXCopy works around some older schemes, it often fails to emulate the latest releases.

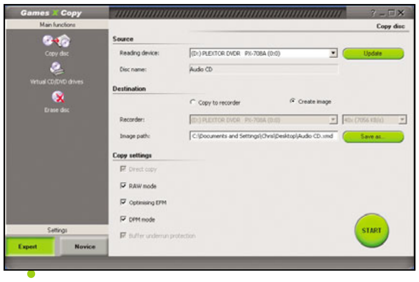
GamesXCopy is easy to use, featuring one mode for novices and another for experts. The main difference between the two modes is a Settings pane with checkboxes for fine-tuning. Even in Expert mode, mousing over each setting invokes a dialog box explaining the option's purpose. A well-written users guide further clarifies questions about burning backups.

Some newer games, such as Far Cry, will function properly if you install from a saved image file, but won't run from copied discs burned using GamesXCopy. As a fix, the utility enables up to four virtual CD/DVD drives specifically for loading and playing images from a hard drive.

The idea of backing up valuable game discs is great, especially if you're an avid LAN gamer. And while GamesXCopy backs up older games with no problem, the latest copy-protection schemes won't be supported until 321 Studios releases a patch. Fortunately, the software comes with free access to all future updates and a money-back guarantee should it fall short of expectations. At roughly $60, though, the app is more expensive than Alcohol 120% and BlindWrite 5, two competitors that offer more features and compatibility.

GamesXCopy runs on Windows 98SE/Me/2000/XP and requires at least a 500MHz processor, 64MB of RAM, 1GB of drive space (more if you create disc images), and a CD/DVD burner. The latest release emulates SafeDisc, Securom 4.8 and below, Laserlok, StarForce, CD-Cops, and ProtectCD. ▲

by Chris Angelini



Source

Reading device: (D:) PLEXTOR DVDR PX-708A (0:0)

Disc name: Audio CD

Destination

○ Copy to recorder ● Create image

Recorder: (D:) PLEXTOR DVDR PX-708A (0:0) 40x (7056 KB/s)

Image path: C:\Documents and Settings\Chris\Desktop\Audio CD.xmd

Copy settings

☑ Direct copy

☑ RAW mode

☑ Optimising EFM

☑ DPM mode

☑ Buffer underrun protection

GamesXCopy 9
$59.99
321 Studios
www.321studios.com
CPU CPU C

MixMeister Technology Express 5

The dance club just isn't the same without a swift DJ spinning vinyl and mixing the hottest jams until 2 a.m.—at least until now. MixMeister Express 5 from MixMeister Technology is the latest in a family of apps that claim to transform music files into custom mixes, complete with beat matching, normalized volume, and pitch-correct tempo adjustment.

At MM5's core is a patented beat-matching algorithm that automatically balances tempo and volume as it fades between songs. The result, mostly, is a hip transition that sounds professionally mixed on stage. Some songs have lengthy intros, though, and don't sync as well, which is why MM5 also facilitates custom mixing with manual beat adjustment, sample overlay, looping, and nondestructive editing.

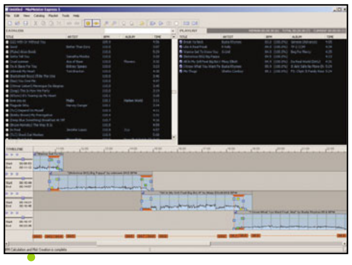
Though MM5's feature set may sound intimidating for novices, it is simultaneously powerful and extremely easy to use. Getting started is as easy as importing your MP3s into MM5's catalog, dragging a few files into the playlist, and listening to the generated mix. If there are awkward transitions, simply zoom into the timeline and cut out the vocal intro or manually drop the secondary bass line to avoid competing beats. You can also edit on the fly while your playlist runs.

MixMeister also sells an advanced version of the same package called MixMeister Pro 5 ($190). Geared toward more demanding users, the Pro package features catalog management, real-time VU meters, beat-mixed overlay loops, and support for a second sound card, which is used for previewing a mix before it goes live. Both versions come with built-in CD-burning software to transfer mixes directly to disc.

Express is plenty powerful for budding enthusiasts. It incorporates the most important features of MixMeister Pro and doesn't burden the user with too many advanced controls.

MixMeister Express 5 requires Windows 98SE/Me/2000/XP, a Pentium II 400MHz, 128MB of RAM, and a sound card. Use a beefier system if you have it, though, as MixMeister's automatic BPM calculator and plot generator run in the background. ▲

by Chris Angelini



MixMeister Express 5
$49.95
MixMeister Technology
www.mixmeister.com
CPU CPU CPU CPU

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

Same award-winning performance. Now available with a 5-CD Changer.

When we introduced the Acoustic Wave® music system, audio critic Wayne Thompson called it "simply the best-sounding compact stereo system in captivity." *Sound & Vision* reported that it delivers "possibly the best-reproduced sound many people have ever heard." By offering the sound of a big, complicated stereo system – but from an all-in-one music system hardly the size of a briefcase – the Acoustic Wave® music system set a new industry standard.

So how did we make this award-winning system even better? By listening to owners and developing the CD changer they asked for. Engineered specifically for the Acoustic Wave® music system, our 5-CD Changer allows you to enjoy hours of music. You can even use it to connect other audio sources to your system – transforming it into a versatile audio center for movies, music and more.

Lifelike sound – without interruption.

Our separate 5-CD Changer lets you savor the Acoustic Wave® music system's award-winning sound for hours on end. Load your five favorite CDs and press Play. You'll hear your music come to life with crystal-clear highs and deep, enveloping lows that fill the room.

Patented acoustic waveguide speaker technology is what allows the Acoustic Wave® music system to deliver such a spacious, lifelike performance. And our 5-CD Changer lets you enjoy that room-filling sound without ever having to stop the music to change CDs.

Beyond music – without complication.

Our 5-CD Changer also lets you connect your Acoustic Wave® system to additional audio sources and switch among them at the press of a button. Connect it to your TV, VCR, DVD player or computer – and enjoy Bose® quality sound from everything you listen to or watch.

The Acoustic Wave® music system and 5-CD Changer were both designed for complete ease of operation. There are no speakers to connect and no confusing dials to adjust. Every feature operates with intuitive simplicity. And the credit card-sized remote control lets you operate the system and all CD-changer functions with ease.

Try them for yourself, risk free.

Experience the Acoustic Wave® music system and our versatile, easy-to-use 5-CD Changer in your home for 30 days, satisfaction guaranteed. Call today and **save $150** when you order the Acoustic Wave® system together with our 5-CD Changer. Be sure to ask about our **financing options** when you call.

SAVE $150 when you order the Acoustic Wave® music system with our 5-CD Changer by June 30, 2004.

The Acoustic Wave® music system and 5-CD Changer are available from Bose, the most respected name in sound.

Call 1-800-905-1406

Ext. G6252

For information on all our products: **www.bose.com/g6252**

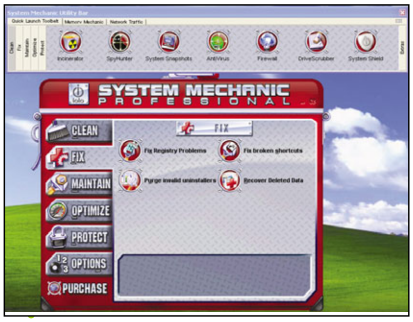
Name____________________
Address____________________
City____________ State______ Zip________
Day Phone____________ Eve. Phone____________
E-mail (Optional) ____________________

Mail to: Bose Corp., Dept. DMG-G6252, The Mountain, Framingham, MA 01701-9168

BOSE®
Better sound through research®

©2004 Bose Corporation. Patent rights issued and/or pending. The Acoustic Wave® music system design is also a registered trademark of Bose Corporation. Financing and reduced price on 5-CD Changer package not to be combined with any other offer or applied to previous purchases, and subject to change without notice. Risk free refers to 30-day trial only. Delivery is subject to product availability. Quotes are reprinted with permission: Wayne Thompson, *Oregonian*, 8/15/89; Julian Hirsch, *Sound & Vision*, 3/85.

iolo Technologies System Mechanic Pro 4.0



System Mechanic Pro 4.0
$44.95; $69.95 (Pro)
iolo Technologies
www.iolo.com
CPU CPU CPU CPU

Norton SystemWorks for Windows has arguably been the king of utility suites for four years, but its lack of new features may have opened the door to competitors. Rising to the challenge is System Mechanic Pro 4.0, recently beefed up with comprehensive antivirus and firewall programs compliments of Panda Software. Combined with its other utilities, SMP4 is a worthy competitor, suffering only from a hodgepodge of different interfaces and unintuitive utility names.

SMP4's utilities include antivirus (with email-attachment scanning) and firewall (with support for servers and LAN file sharing) apps, adware/spyware detection, Registry cleaning and maintenance, file maintenance, a free space locator, disk defragmenter, Internet History cleaner, pop-up stopper, deleted file and memory recovery, Windows "hidden settings" tweaker, and file/disk secure eraser. A Standard version ($49.95) is available without the antivirus, firewall, drive scrubber, and file recovery tool.

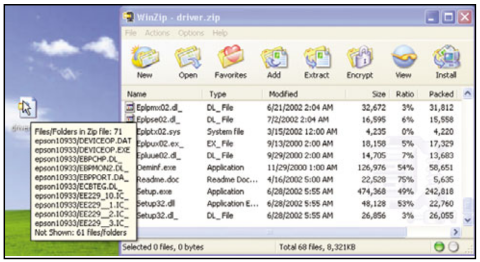
SMP4 offers a dashboard of sorts to launch and manage its utilities, but it felt while testing that the utilities were created by different programmers. (I tested on a 2GHz P4 system with 256MB of RAM and WinXP.) The programs don't actually interfere with each other, but they don't integrate with each other, either.

Panda AntiVirus compares favorably with Norton AntiVirus, but many of its features offer no more power or ease than many shareware or freeware titles; some offer much less. With enough sleuthing, you could probably come up with your own suite that actually outperforms SMP4, in certain areas, for less money. On the other hand, if you regularly need to locate deleted files or emails or scrub hard drives and floppies clean, SMP4's utilities may have no equal.

If you want a single installation routine, single support source, and seamless automatic updates, SMP4 is a good choice with solid, wide-ranging tools and no duds in the bunch. ▲

by Warren Ernst

WinZip Computing WinZip 9.0



Name	Type	Modified	Size	Ratio	Packed
Eplpmx02.dl_	DL_ File	6/21/2002 2:04 AM	32,672	3%	31,812
Eplpse02.dl_	DL_ File	7/2/2002 2:04 AM	16,595	6%	15,558
Eplptx02.sys	System file	3/15/2002 12:00 AM	4,235	0%	4,220
Eplpux02.ex_	EX_ File	9/13/2000 2:00 AM	18,158	5%	17,329
Epluue02.dl_	DL_ File	9/29/2000 2:00 AM	14,705	7%	13,683
Deminf.exe	Application	11/29/2000 1:00 AM	126,976	54%	58,651
Readme.doc	Readme Doc...	4/16/2002 5:00 AM	22,528	75%	5,635
Setup.exe	Application	6/28/2002 5:55 AM	474,368	49%	242,818
Setup32.dll	Application E...	6/28/2002 5:55 AM	48,128	53%	22,760
Setup32.dl_	DL_ File	6/28/2002 5:55 AM	26,856	3%	26,055

Files/Folders in Zip file: 71
epson10933/DEVICEOP.DAT
epson10933/DEVICEOP.EXE
epson10933/EBPCHP.DL_
epson10933/EBPMON2.DL_
epson10933/EBPPORT.DA_
epson10933/ECBTEG.DL_
epson10933/EE229_10.IC_
epson10933/EE229__1.IC_
epson10933/EE229__2.IC_
epson10933/EE229__3.IC_
Not Shown: 61 files/folders

Selected 0 files, 0 bytes
Total 68 files, 8,321KB

WinZip 9.0
$29
WinZip Computing
www.winzip.com
CPU CPU CPU CPU

WinZip is an app just about everyone uses. It's essentially the de facto standard for Windows file compression, and for good reason: It's simple to use, has a good feature set, and works with almost all files you're likely to encounter or want to create. And although it's shareware, WinZip would run for, ahem, years in its unregistered state. WinZip 9.0 alters none of this, plus adds worthwhile and genuinely useful features. Because registered users get a free upgrade, recommending it is a no-brainer.

Sure, Windows XP can create and open compressed files with its Compressed Folder feature, but it takes longer, makes bigger files, and won't let you do things such as delete files from an archive, delete non-empty folders, password protect files, split archives into smaller files, or make self-extracting archives. WinZip 9.0 can do all this; plus, now archives have no practical size limits, eliminating the old 4GB/65,535 files barrier. The vulnerable WinZip6/7/8 encryption scheme has been replaced with a 128- or 256-bit AES encryption scheme, and a security flaw in nearly all previous versions is now corrected.

Other nice touches add up to a huge increase in usability. Place your mouse cursor over a Zip file and a tool tip appears, listing up to 25 of the files within the file. The Extract To dialog box is stretchable and displays many more folders. Right-clicking a Zip file displays the last few locations that archives were decompressed to and offers direct emailing. As always, drag and drop is fully supported.

Perhaps most frustrating is WinZip's continued incompatibility with RAR and some CAB archives and its continued reliance on third-party programs to handle ARC, ARJ, and LHA archives. The fact that there are many free alternatives that are almost as nice may turn you off, too. Yet, with no operational problems, a great set of features, good interface, and free upgrade path, WinZip 9.0 should continue to be the program that everybody uses. ▲

by Warren Ernst

CPU Ranking: 0 = Absolutely Worthless CPU CPU C 2.5 = Absolutely Average CPU CPU CPU CPU CPU 5 = Absolutely Perfect

by Pete Loshin

Fun & Games

Pete Loshin, former technical editor of software reviews for Byte Magazine *(print version), consults and writes about computing and the Internet. He also runs www.linuxcookbook.com. He owns shares of both Microsoft and Red Hat and believes that Windows isn't for everyone, but neither is Linux.*

For the past month or so, I've played games under Linux. Someone's got to do it. I get more questions about Linux gaming than any other free-software topic. My stock answer that, "I'm not really interested in games, but most distros include a nice selection" just isn't cutting it anymore.

This month I finally tried as many different games as I could. That meant digging up my el-cheapo USB joystick and cruising for software. Sourceforge.net and Freshmeat.net both list hundreds of gaming projects (Sourceforge hosts a special gaming foundry at gaming.foundries.sourceforge.net), but I thought it might be smart to try some gaming-only sites to get a more realistic view.

The top of the list is the Linux Game Tome (happypenguin.org), which lists more than 1,300 different gaming-related software projects—browsable by project type, rating, etc.—plus blog-style news items and commentary.

LinuxGames (linuxgames.com) is a commercial site, which means ads, reviews, and articles about Linux gaming in general. For answers to all your frequently asked Linux gaming questions, the Linux Gamer's FAQ (www.icculus.org/lgfaq) covers everything from how to get your USB joystick to work (execute the command modprobe hid at the command line) to where to buy boxed commercial games for Linux. I found the FAQ game list at www.icculus.org/lgfaq/gamelist.php (with more than 300 listings, half released under free licenses) to be most useful.

Speaking of commercial Linux games, the options keep getting better as game publishers port product to (BSD-based) Mac OS X. I didn't want to get involved with the complications of proprietary software, so I don't have much to say about it other than check out the FAQ for more about buying it.

Computer games have been around almost as long as computers.

Computer games have been around almost as long as computers. John Conway's Game of Life (www.bitstorm.org/gameoflife), first described in a 1970 *Scientific American* article, is the great-granddaddy of them all; the rules are so simple that it has become a classic programming class assignment.

Another geeky, artificial life-oriented classic (20+ years), Corewars (corewars.sourceforge.net), has players write warrior programs that reproduce themselves while erasing competitors within a virtual computer. Nowadays, players not only write their own warriors, they also write their own programs for evolving their warriors.

More relaxing is the ASCII-only NetHack (nethack.org), a classic PC implementation of a multilevel dungeon exploration/adventure game, at over 20 years old. For those with too much CPU and too little imagination, Falcon's Eye (www.hut.fi/~jtpelto2/nethack.html) grafts a luxuriant GUI on top of NetHack, complete with sound effects.

Nostalgia for other classics drives a thriving development community that churns out clones of numerous computer and console games. For example, L Games (lgames.sourceforge.net) does awesome interpretations of Breakout, Tetris, and Panzer General. Then there's Freeciv (freeciv.org), a turn-based strategy game compatible with Civilization II by Microprose.

Retro gaming is cool, but real-time, online multiplayer action games are where the real action is, and as often as not, game clients are available for Windows/Mac/commercial *nixes, and Linux. Consider BZFlag (bzflag.org), a multiplayer, multiplatform, 3D tank battle game or Battle for Wesnoth (wesnoth.org).

The Open Racing Car Simulator, aka TORCS (torcs.sourceforge.net), is a 3D racing car sim you can race yourself or program your own robot driver. I didn't program a driver, but I had a fine old time crashing into walls and flipping my car over and over and over.

The selection is at times more and less traditional than that for other gaming platforms. Implementations and adaptations of chess, Go, backgammon, and other board game clones, join numerous solitaire versions.

Great Linux gaming software, free and commercial, shouldn't be any more surprising than other free software. Just don't be surprised when links to some of the more intriguing games listed at gaming meta-sites come up 404. After all, consider how many commercial software vendors sell vapor or design a high-concept hit and then go out of business.

Next month, I'll look at thriving free projects that enable anyone to design his own games. ■

Get saucy with Pete at pete@cpumag.com.

Dialogue Box

by Chris Pirillo

Personal Homeland Security

Where would we be without our computers? Probably out playing Jai-Alai a little more often, actually. Let's assume that you prefer activities that involve more physical exertion than running an application or surfing the Internet, whether this is the case or not. Humor me.

When you're away, do your mice play? Do objects seem to be shuffled around on your desk when you return? You didn't feed furry, little creatures after midnight did you? Keeping a watchful eye over your environment doesn't require state-of-the-art, high-dollar video equipment monitored by outside parties for monthly fees. Your PC can provide live monitoring, image and video capture, Internet streaming, and even motion-detection activation so you know when someone dares to come near your territory.

Hardware is only half of your home security picture . . .

The company that every pop-up hater loves to despise, X10.com, is the obvious first stop. The intrusive marketing blitz of browser windows past is at least partially overcome by its useful array of gizmos. It's not casino-quality stuff, but it's suitable for scoping out your personal parcel of property. If you must go overboard, casinos have insanely gadgety video surveillance, but I don't recommend pestering them about their equipment. They get just as testy as banks when you snoop around the anatomy of their cash safeguards.

X10 video cameras are different from PC Web cams in that they are analog devices and use composite video connectors. X10 has wireless transmitter/receiver devices to get the signal from one place to another, and they do work fairly well if you can manage to avoid dense walls and interference from your microwave. You will, however, need a video-capture device of some variety to bring the signal into your PC. Hauppauge and ATI both have suitable and affordable options for that task but are limited to only one input. If the bundled software doesn't sit well with your needs, there are open-source WDM capture drivers available for cards based on Brooktree 848/849/878/879 chipsets (btwincap.sourceforge.net) that can help smooth the rough spots sometimes encountered with third-party capture applications if the manufacturer's driver set angers your PC.

Another option is to use composite-to-USB adapters, which are available from X10, as well as other sources online. The key is to ensure that they do show up as standard WDM capture devices.

Hardware is only half of your home security picture because you'll need some way to control and monitor what's on the other side of the lens. The available software for this task is nearly endless. From simple Web cam apps typically bundled with cameras to myriad shareware titles to more feature-rich titles like Webcam32 from Surveyor (www.webcam32.com) and the popular webcamXP Pro (www.webcamxp.com). Neither is free, but if security is your intent, the free route may leave you wanting more.

Both titles support multiple video-capture sources, can stream to the Web, and provide FTP uploading, plus more. What makes these two noteworthy is that both developers offer a server product with the client piece, tying together cameras on several PCs. The most obvious advantage of webcamXP Pro is support for IP-based devices, including wired and wireless network-connected cameras. Surveyor's server piece is the same price ($99.95) as the webcamXP Pro client portion, so consider your requirements before diving into webcamXP due to the higher cost for the whole shebang.

If you use X10 gear, the software offered is adequate, has plenty of features, and is obviously compatible, but it commands some stiff prices for the features provided. As long as your camera's drivers install as a viable WDM capture source, most Web cam or capture software should function.

For the ultra-geek or small-office environment, consider the Windows Media Services components bundled with Microsoft's Windows Server 2000/2003 products. It's free, streams to the Web very well, and requires no assistance from the corporate rocket science department to implement. This route offers no remote interaction, though you can watch the stream from virtually anywhere because Windows Media Player is the Visa of the computer world: It's everywhere you want to be. ■

You can dialogue with Chris at chris@cpumag.com.

If you're looking for Chris in the electronic form, just hop over to Yahoo!, MSN, or Google. You'll quickly discover that he's the No. 1 Chris on all three major search engines. Don't need money, don't take fame, don't need no credit card to ride this train. Tougher than diamonds and stronger than steel—that's the power of blog. Chris.pirillo.com, specifically. There's also Lockergnome.com (full of information, but not so much of a blog) and Rentmychest.com (no information, and nowhere near a blog). Don't forget about Gnomedex.com, which has the latest information on Chris's upcoming tech conference set to take place from Sept. 30th to Oct. 3rd 2004 in Lake Tahoe, Nev. My, somebody's been a busy boy!

Hearing is Believing

PC WORLD
WORLD CLASS
2003

revolution 7.1

High-Definition Surround Sound for Your PC

Revolution 7.1
- PCI solution for high-definition surround up to 7.1
- 24-bit/192kHz output up to 8 channels
- Professional 24-bit/96kHz recording
- Real-time stereo-to-surround conversion
- Incredible 107dB SNR provides pristine audio

Sonica Theater
- USB solution for surround up to 7.1
- Up to 24-bit/96kHz audio output
- Professional 24-bit/96kHz recording
- Real-time stereo-to-surround conversion

TRUE 24 bit 192 kHz High Definition

M-Audio's audio cards deliver immersive surround sound on your computer, rivaling that of the best movie theaters. Games, movies, and music—even your stereo CDs and MP3s—all sound more alive and intense with M-Audio surround solutions. Now you can enjoy amazing new cutting-edge audio standards like 7.1 surround sound and high-definition 24-bit/192kHz fidelity. Support for popular surround formats including Dolby Digital and DTS, as well as gaming standards like Sensaura, EAX, DirectSound and A3D, insures that you'll hear everything exactly the way it was intended.

Only one name is found in more studios and is used by more music professionals than any other: M-Audio. Now we've distilled all that experience into the most powerful, high-fidelity PC surround sound solutions available. In fact, PC World recently gave the Revolution 7.1 its highest accolade–the coveted World Class Award 2003.

Get M-Audio. Get M-Powered.

available at
COMPUSA®
WHERE AMERICA BUYS TECHNOLOGY.℠

M-AUDIO
www.m-audio.com

Surfing The CLASSIFIEDS

Get Results From Your Online Job Search

You're an IT pro, right? If anyone knows how to leverage the Internet to find a new job, it's you. Right? Think again. Getting results from an online job search in the IT sector is not as easy as knowing which sites to go to and how long to make your resume. On a job hunt, you are the product, so your first task is to do market research and understand the needs and wants of buyers.

In talking to experts from trade associations, staffing companies, and online job sites themselves, we discovered that most of their advice to job applicants flows out of an understanding of how the IT jobs picture has evolved in just the past few years and also how corporate human resources managers now use the Web to find and filter job applicants.

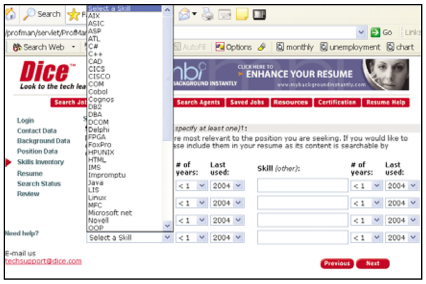
IT Is Back, But . . .

Despite high unemployment, "We are definitely seeing signs of improvement," says Melissa Maffettone, branch manager, Robert Half Technology, which helps companies assemble their tech staffs. After years of belt-tightening, companies are now reinvesting in people and technology. At the largest and oldest IT job site, Dice, "postings have increased 40% since the beginning of the year," says company spokesperson Susan Simcox. The 40,000 IT job listings now at Dice is the highest the company has seen in the past several years.

Still, the new IT market is much different from the go-go tech '90s. Marjorie Bynum, vice president of workforce development at ITAA (Information Technology Association of America), warns candidates not to expect the legendary perks that characterized the seller's job market of the last decade. "The days of the huge signing bonuses and free SUVs are gone," she says. Often, too, companies are reinvesting cautiously and relying on contracted workers ("project professionals") for limited time periods rather than permanent full timers. As we will see, any good online job search has to follow the market outside the usual job postings.

The Personal Web

Everyone agrees that before hitting the job listings themselves, IT job hunters must activate their own web of contacts and alert them that they are looking for work. "It is critical," insists Maffettone, whose staffing firm conducted research that showed "one-third [of HR managers] think that employee referrals are the most effective way to find IT candidates." Email or phone all co-workers, friends in and out of IT at other firms, places you have volunteered, and past workplaces to get the word out. "I will take a referral over a resume any day of the week," Maffettone says.



The personal profiler at IT job site Dice.com ensures that job seekers use all the right terminology in their files so that they pop up when HR managers do keyword searches in the candidate databases.

Just as important is using the Web to locate and participate in trade associations that serve the IT field generally and your specific career area. The ITAA (www.itaa.org) and the Help Desk Institute (www.thinkhdi.com) are just two examples. Especially helpful is the Council of Regional Information Technology Associations (www.crita.org), which links to scores of state IT groups. Both online and offline, interact with the local organizations in order to find out about companies, discover unposted jobs that may be available, and generate possible references for when you do apply locally.

Start Big, End Narrow

When you do finally hit the online job boards, start with the venerable brands. (See the "Apply Within: IT Job-Hunting Resources" sidebar.) The best sites for IT have a multitude of job-hunting resources in addition to fresh listings that you can see change frequently. For highly specialized job sites, use links from the relevant trade associations, but also use the Web sites of your specialty's trade publications (such as ITWorld.com and NWFusion.com). These publications often have newsletters, articles, and even some postings that are highly targeted to your specialty.

Generally, the job-hunt pros suggest that you start an online hunt very broadly, using the most general search terms and rifling through a ton of listings rather than immediately looking for the right job. This first pass at the job sites is more about market research, so take notes. You should identify the types of jobs in your specialty that are available, the companies and sectors that seem to be hiring, and especially the skill sets most in demand.

The current job market is about "skill matching," says Bynum. Companies are no longer simply staffing up in IT. The hiring is more strategic and precise, where HR managers are looking to match job openings with evermore specific skill sets, not just warm bodies. Use the broad search to help identify in yourself the skills you do and do not have for this marketplace and also to learn the terminology used to describe them. "When working on your resume, you want to think about which skills you have to match these needs," says Simcox.

Don't forget to go local, advises Maffettone. Because they don't want to pay for relocation expenses on a new hire, many companies advertise only in their region at newspaper sites or localized versions of sites, such as craigslist.org.

The Unlisted Listings

Too many job hunters only use job sites to find listings and send resumes for specific openings, but this is the best way to miss out on the jobs that are not apparent online. Always fill out a personal profile at the jobs sites you trust and post your resume. According to Dice's Simcox, "a lot of our customers don't necessarily post their jobs; they use the database search [of profiles] exclusively. You are missing out on some of the positions that might be open to you if you only look for job listings." Also, be ready to write and post several versions of your resume that emphasize different aspects of your experience and skill set so that the appropriate area of your expertise stands out for the right job.

Also off radar of many job sites is the large market for limited-time contract and project work. Both Dice and Techies.com carry some of these positions, but many companies turn to staffing firms for these needs. Resources such as Robert Half Technology (www.rhic.com), Kforce (www.kforce.com), and many others are online and take resumes and profiles just like the more familiar job sites. Again, these companies usually know of jobs that never make it to the IT career sites.

My Resume, My Database

When creating or posting a resume or even emailing it to an HR department, keep in mind that companies often start their review by treating these resumes as a series of data points, not a prose portrait of you. They use keyword searches to scan for people with specific skill sets, certifications, and experience. By the way, this usually applies to snail-mailed hard copy resumes, which many companies now

Apply Within: IT Job-Hunting Resources

There are many, many sites out there for IT careers. Here is a sample of the more trusted and richest sources, many of which link to even more resources for specialized fields.

Listings

ComputerJobs.com. This site is distinguished by its user-friendly breakdown of jobs by region, skill sets, and job titles. The site claims about 2,500 new listings a week and has been serving the IT world since 1995.

ContractJobHunter. This Web complement to the print pub, *Contract Employment Weekly*, focuses solely on IT contract work. ContractJobHunter (www.cjhunter.com) has a remarkable range of tools for hunter and employer alike, such as emailing your resume to member companies and including you on Hot Sheets of workers newly or soon-to-be available for hire. Only subscribers are allowed into these riches, however.

Computerwork.com. Founded in 1995, Computerwork.com has more than 7,000 listings divided by state and an excellent set of resource links to career services companies, organizations, and more.

craigslist.org. One of the oldest job-posting communities online is a favorite of tech managers, and it now has localized versions in most major U.S. cities. craigslist.org is a great source for quickly posted openings that often don't show up elsewhere.

Dice. This is the granddaddy of tech job sites, with more than 40,000 listings and a history of specialization in IT. Dice (www.dice.com) is a great starting place because it probably sports the widest collection of resources for career advice and links to services, search agents, and email alerts for tracking new posts in your specialty.

Monster Technology. While the massive Monster jobs site may not seem the likely place for tech specialists to go, it actually has a very competent section devoted to IT (technology.monster.com), with specialized resources and advice articles.

techies.com. This venerable IT jobs site has great listings and resources, as well as contract work and a very strong collection of articles and tools called the IT Career Builder Toolkit.

USAJOBS. The federal government is the largest IT employer on the planet, and USAJOBS (www.usajobs.opm.gov) is the place where all of the relevant agencies post their jobs.

Specialized Publications

For highly targeted job searches, don't overlook listings and career advice from trade publications that serve your particular job niche.

CIO.com. If you are an upper-level IT executive, *CIO* magazine's online presence is the place to start a job hunt. With exclusive listings for jobs worldwide, career advancement advice, and very active forums with other executives, this resource is indispensable for those on their way to the top.

Gamasutra. The online companion to *Game Developer* magazine, this superb site (www.gamasutra.com) has one of the most comprehensive listings of tech jobs in the game industry.

Network World Fusion. The Web extension of *Network World*, Network World Fusion (www.nwfusion.com) is exceptional for its IT career advice, including weekly newsletters, a salary calculator, regular surveys of hiring managers, and specific news about the IT jobs market.

Associations

Association of Information Technology Professionals. The 50-year-old AITP IT organization (www.aitp.org) has scores of local chapters throughout the United States, most of which post their upcoming events and networking opportunities on the site.

Information Technology Association of America. This group (www.itaa.org) has an excellent calendar of local events and regular research about the state of the IT jobs market. This is a great place to read the pulse of the field.

Software Contractor's Guild. The Software Contractor's Guild (www.scguild.com) is an organization of software contractors and consultants that also carries contract job listings indexed neatly by date, position, location, and skill set. ▲

simply scan and dump into their database for searching. That means that you need to make sure that the skills listed in the resume get hit in a search. This is one of the functions of that first broad pass of job listings we mentioned earlier. Track the terms used in job listings to describe your skills and use those in your profile and resume. "Make sure you assemble your keywords and precisely match them," says Simcox. "If you know HTML, put down HTML, not that you make Web pages."

Once your resume makes it past the first search cuts, then it actually gets read; here is where the prose matters. All the experts agree that resumes should "show how you used the skills—experiences and examples," says Simcox. "Be able to pick out specific projects you worked on and include the return on investment it provided your employer," says Maffettone. If your implementation of help desk software saved time and money on each support call, then say so and quantify it. This demonstrates to a company that you are focused on their business, not just your career, and that you recognize how your real job is to make money for them.

One very important aspect of the new IT job market is a much greater focus on "soft skills" in job candidates. The age of the socially arrested, anonymous, Jolt-guzzling programmer in the end cubicle is so over, say the pros. More than ever, IT involves interacting with consumers, leading project teams, and making presentations to others in the company, so all of the experts we consulted strongly suggest that in resumes, phone calls, and interviews, job candidates stress their ability to write, present, talk, and interact well with others. "I would go so far as to say it plays a deciding factor when deciding between two candidates," says Maffettone. Bynum says that in an ITAA poll of IT HR managers, written and oral communication skills were among the most sought after soft skills for tech jobs.

Learning To Read

When you do hone in on a job listing you think matches your skills, read it very carefully several times so that you understand what the posting is really looking for. Posts often ask for a laundry list of qualifications because managers are hoping to hit the dream candidate, but don't let that intimidate you and keep you from applying. Look for the skills and requirements the poster spends the most time discussing because these are the ones most vital to getting the job. Also important are the years of experience the job requires and the specific areas that require real experience and not just certification. And don't think you need to match every qualification. "If you read a job listing and think you can do a good job at it and have three-quarters of the skills, then apply and sell yourself," says Simcox. "Passion and enthusiasm are really important."

To fully understand a job post, try going to the hiring company's own Web site where often you will find a more detailed posting in its own careers section or a cluster of postings that help you better understand where this job may fit into a series of related hires. "Or call the HR department and ask," says Bynum. Getting a richer description directly from HR gives you a human contact at the company if you do apply, it demonstrates real interest, and it can spare you from wasting time on irrelevant job openings.

As far as certification goes, the IT job pros all say that these diplomas are nice to have and can help HR decide between two equally attractive candidates, but they do not replace experience for most employers. Do not let the lack of required or preferred certification keep you from applying.

The Limits Of The Web

The tech industry has been leveraging the Web and its predecessors longer than just about any other profession, so it is natural to think all good things can be done online. In fact, says Maffettone, "Do not rely solely on using [online] job postings or applying to job postings as your sole means to finding positions." In a field where harvesting and scanning resumes for keywords is the norm, human contact with employers and others in the field is one of the best ways to stand out from the database. "Sending a resume and following up with a phone call still works," says Bynum. "Following up is key. Companies respect that. It lets them know you are interested." It also helps reinforce in their minds those soft skills of interacting well with others and verbal acumen.

Bynum also advises you keep in contact with others in the company to which you are applying because these are the ones who know the relevant hiring managers and can help them put a face and voice to the resume. Physical networking at local business functions or at national trade meetings is the best way to reinforce whatever work you do online to find and pursue a job. According to the pros, one of the smartest ways to use the Internet to secure a new job is to know when it is time to stop using the Internet to secure a new job. CPU

by Steve Smith

Infinite Loop

Family Upgrades To New Jon

Most expectant parents either toil over lists of baby names or simply name the child after a parent and tack "Jr." onto the end of the name. Jon and Jamie Cusack did neither. In a few years, instead of shouting "Junior!" when it's time for lunch, these parents might shout "2.0!" They named the newest member of the family Jon Blake Cusack 2.0. The proud Jon 1.0 and wife Jamie even sent email messages to friends and family announcing the upgrade and the new features of Jon 2.0. ▲

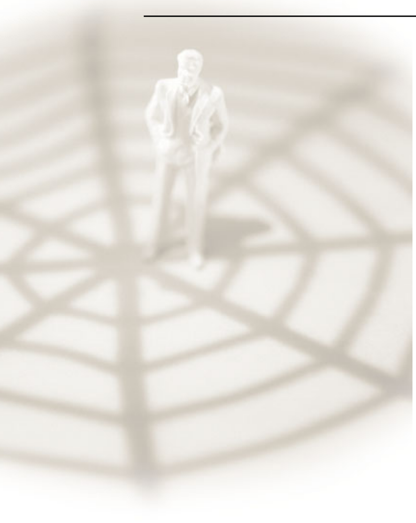
© 2003 PriceGrabber.com. Products/trademarks shown are not in any way intended to indicate an affiliation or endorsement of PriceGrabber.com by their respective holders

With hundreds of digital cameras to compare, you'll definitely find one that clicks.

If you're into digital photos or video, finding the right camera is no longer a shot in the dark. That's because PriceGrabber.com provides the fastest, most convenient way to locate and research the best products and prices online. Simply choose your criteria, click, and within moments you're comparing cameras by brand, features, popularity and price. While you're at it, get the lowdown on products and merchants from buyers just like you. Bottom line? Whether you're shopping for cameras, computers, TVs, or thousands of other popular items, PriceGrabber provides all the information you need to make the best buying decisions.

• Computers • Software • **Electronics** • Video Games • Movies • Music • Books • Toys • Office Products

PriceGrabber.com
Comparison Shopping Beyond Compare.™



Coder's Corner: XML

Introduction To XML Schema

Last month (June 2004, page 86) we looked at the history behind schema languages for XML and why it took so long to get to a specification for a new language, XML Schema. This month we look at how XML Schema works in contrast to DTDs. In coming months, we'll look at the new features this newer approach provides.

Unlike DTDs, XML schemas are written using XML elements. The outline for all XML Schema documents is very similar, or something like this:

```
<?xml version="1.0" encoding="UTF-8" ?>
<xs:schema xmlns:xs="http://www.w3.org/2001
   /XMLSchema" >
... schema declarations go here ...
</xs:schema>
```

XML Schema elements come from the namespace http://www.w3.org/2001/XMLSchema (associated here with the prefix xs). Schema definitions (or declarations) are all inside this xs:schema wrapper. Note the absence of other namespace declarations. The preceding defines schema rules for elements that aren't in any namespace. Things get a bit complicated when namespaces are introduced.

Suppose we want to use the schema to model documents such as the following:

```
<data>
  <item id="a342>
    <name>Marie Curie </name>
   <birthday> 7 Nov 1867</birthday>
    <birthPlace>Warsaw, Poland</birthPlace>
    <favoriteColor>green</favoriteColor>
    <comments> interesting stuff ... </comments>
    <mainInterest> radioactivity ... </mainInterest>
  </item>  ... more items ...</data>
```

We used this example of famous physicists in various XSLT examples in "Coder's Corner" articles throughout 2003. The following is the notional model behind this document:

- The data element contains one or more item elements (but can't contain text data).
- Each item element has a unique ID value (so each can be referenced uniquely).
- Each item element must contain the name, birthday, birthplace, and favoriteColor elements. They can be in any order, but there can be only one of each.
- Each element can optionally contain a single comments and a single mainInterest element.
- Item elements can't contain text data. (They can only contain the elements just noted.)
- The elements inside <item> can contain text data (but no elements).

A DTD for this would look something like the following, where the item element declaration allows only the stated order for the elements inside it:

```
<!ELEMENT data (item)+>
<!ELEMENT item (name, birthday, birthPlace,
   favoriteColor, comments? mainInterest?)>
<!ATTLIST item   id ID #REQUIRED >
<!ELEMENT name (#PCDATA)> <!ELEMENT
   birthday (#PCDATA)>
<!ELEMENT birthPlace (#PCDATA)> <!ELE-
   MENT favoriteColor (#PCDATA)>
<!ELEMENT comments (#PCDATA)> <!ELE-
   MENT mainInterest (#PCDATA)>
```

If these declarations are stored in a file (stuff.dtd, for example) adjacent to the actual XML, the document referencing this external subset will look like:

```
<!DOCTYPE data SYSTEM "./stuff.dtd" >
<data>  ... content of document </data>
```

Rewriting Using XML Schema

The DTD model can be rewritten using XML schema as follows (in the file stuff2.xsd, we'll say):

```
<?xml version="1.0" >
<xs:schema xmlns:xs="http://www.w3.org/2001
   /XMLSchema" elementFormDefault="quali-
   fied">
   <xs:element name="birthPlace"
   type="xs:string"/> <xs:element name="birth-
   day" type="xs:string"/>
   <xs:element name="comments"
   type="xs:string"/> <xs:element name="name"
   type="xs:string"/>
   <xs:element name="favoriteColor"
   type="xs:string"/>
   <xs:element name="mainInterest"
   type="xs:string"/>
```

```
<xs:element name="data">
   <xs:complexType>
        <xs:sequence maxOccurs=
        "unbounded"> <xs:element
        ref="item"/> </xs:sequence>
        </xs:complexType>
   </xs:element>
   <xs:element name="item">
   <xs:complexType>
        <xs:sequence>
            <xs:element ref="name"/>
            <xs:element ref="birthday"/>
            <xs:element ref="birthPlace"/>
            <xs:element ref="favoriteColor"/>
            <xs:element ref="comments"
            minOccurs="0"/>
            <xs:element ref="mainInterest"
            minOccurs="0"/>
        </xs:sequence>
        <xs:attribute name="id"
        type="xs:ID" use="required"/>
   </xs:complexType> </xs:element>
</xs:schema>
```

We can work through the structure by sections. To start, <xs:element> elements declare element types. A simple example is:

```
<xs:element name="birthday" type=
   "xs:string"/>
```

This declares an element named "birthday." The type attribute defines the content allowed inside birthday elements. Here, this calls for xs:string, a special string type (note the xs: prefix). XML Schema defines 44 "simple types" and provides ways for designers to create their own. DTDs support only nine and only for attribute values.

In XML Schema, elements defined just inside the xsi:schema element are “global elements." Their definitions can be used elsewhere inside the schema document.

XML Schema supports complex and simple types. Complex types have element content inside them. Simple types have content that's just text. Complex types define a document’s structural rules. Simple types define what’s inside this structure. Here, the document’s overall structure is defined by:

```
<xs:element name="data">
   <xs:complexType>
 <xs:sequence maxOccurs="unbounded">
   <xs:element ref="item"/> </xs:sequence>
</xs:complexType> </xs:element>
```

This declares "data" elements to be complex types. The markup inside xs:complexType defines the structural rules. xs:sequence says the content is an ordered sequence of elements and the maximum number of such elements is "unbounded." A minOccurs attribute can set the minimum number of sequences (default 1). xs:elements inside xs:sequence identify the elements in the sequence (just item elements here). Note the markup:

```
<xs:element ref="item" />
```

This says that the sequence consists of item elements but that the definition for item elements are global definitions found elsewhere. This is similar to DTDs, where <!ELEMENT data (item)+ > tells what must be in data elements, but the declaration is found previously in the DTD.

The item element declaration is similar but more complex. Here xs:sequence defines a set of elements that must be inside the element in the specified order. There are no minOccurs or maxOccurs attributes, so the sequence must occur only once inside an item. The xs:elements inside the xs:sequence define which elements, the order, and how many must be there. (The default, when minOccurs or maxOccurs attributes are absent, is 1.) Note, however, the reference to the comments element:

```
<xs:element ref="comments"
   minOccurs="0"/>
```

minOccurs="0" says the minimum number of such elements is 0. The default maxOccurs value (1) means there can be at most one. Thus, there can be 0 or one comments elements in the sequence.

xs:attribute inside the xs:complexType attaches an attribute to this type of element:

```
<xs:attribute name="id" type="xs:ID"
   use="required"/>
```

This says an 'id' attribute must be present (use="required") on each element and the value is of the indicated type. This defines an attribute specific to this type of element.

Attaching Schema Files

The preceding shows an example schema, but how can an XML document reference it? By using a special schema-related attribute. In this situation, where the target has no namespace, this is:

```
<data  xmlns:xsi="http://www.w3.org
   /2001/XMLSchema-instance"
   xsi:noNamespaceSchemaLocation="http
   ://www.utoronto.ca/ian/articles/jul04/
   stuff2.xsd" >
.... rest of content ... </data>
```

The namespace http://www.w3.org/2001/XMLSchema-instance is for schema-related attributes that appear in regular XML documents. Here, this is noNamespaceSchemaLocation; its value is a URI referencing a schema related to this element and its content. An XML processor can load the referenced file to validate the content.

The example schema declares all elements global and uses ref attributes to define where in the structure they appear. However, a schema can also declare elements locally, or at the explicit locations they appear. Here's an equivalent schema file with purely local declarations:

```
<xs:element name="data">
   <xs:complexType>
<xs:sequence maxOccurs="unbounded">
   <xs:element name="item">
<xs:complexType>  <xs:sequence> <xs:ele-
   ment name="name" type="xs:string"/>
 .. other element definition omitted ...
<xs:element name="comments"
   type="xs:string" minOccurs="0"/>
</xs:sequence>
<xs:attribute name="id" type="xs:ID"
   use="required"/>
</xs:complexType> </xs:element>
   </xs:sequence> </xs:complexType>
   </xs:element>
```

This may seem the same, but it's different, as local elements can be declared differently in different locations. The example says comments elements inside items must contain strings, but a schema could define comment elements elsewhere in the structure to contain differently typed data, such as elements. DTDs can't do this.

---

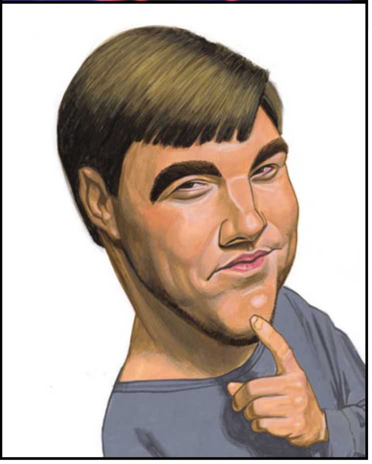
by Ian Graham

(Full examples [plus others] are available at www.utoronto.ca/ian/articles/july04.)

The Department Of Stuff

by Rob "Cmdr Taco" Malda

spectrum.txt



Rob "CmdrTaco" Malda is the creator and director of the popular News for Nerds Web site Slashdot.org. He spends his time fiddling with electronic gizmos, wandering the 'Net, watching anime, and trying to think of clever lies to put in his bio so that he seems cooler than he actually is.

The whole concept of blogging fascinates people. Reporters are always excited to put their finger on new trends, and blogging is still a hot one these days, even though nobody is quite sure how to define it. So let me give that a try, then we can figure out what it means to journalism.

A blog is a diary. Subject matter and linguistic style are irrelevant. All that matters is that the blog is written with a single voice and that it is publicly available to the world. That's it.

The beauty of the blog is that the technology that powers it has made it easier for individuals to share a piece of themselves with the world. Fifty years ago if you had something to say, actually being heard was almost impossible because you needed to be published and distributed by someone else. The Internet changed this. Now anyone can be read by millions of people, and all that matters is the word of mouth that brings new readers to the best content.

> **Decades ago these major publishers were the only game in town.**

Today journalists are trying to understand how blogs fit in with the media we already have. Here's my take: All content can be mapped along a spectrum whose components are the speed of publishing, the speed and ease of feedback, the barrier to entry, and the trustworthiness of the content. On the far right we have publications such as *Time* and *The Washington Post*. These publications are printed. They have extensive fact-checking procedures. Feedback by way of letters to the editor is very slow. They have large corporate infrastructures. But most importantly, what these publications have is their readers' trust. This is something that is built up over years of doing a good job.

Blogs are at the other end of this spectrum. Feedback is instantaneous. A blog reader likely doesn't know anything about the quality, style, and trustworthiness of the content.

Between these two extremes we have many sites that can provide their own content but can also cause readers from either end of the spectrum to read something on the other. They act as a sort of editorial gatekeeper. This is what sites such as Slashdot do: They provide instant feedback and a certain element of trust. They sift away the noise of a thousand blogs for *The New York Times* crowd. They do this at amazing speeds.

Most often the question people ask me about blogging is whether it will replace journalism, and I think that the answer is a resounding "No." Blogs inevitably will change journalism, but what matters most is that today a person can call himself a journalist not because of the mechanism whereby his words are shared but because of the ethics and quality associated with journalistic integrity.

Historically, publishers fulfilled two separate roles in journalism. First, they provided the distribution mechanism: printing presses, paperboys, television studios, signal transmitters. But this wasn't the most important task. They also fulfilled the task of sorting through the ocean of information out there and tried to sort out the most important bits to share with the world. Then publishers gave their stamp of approval to the stories they ultimately chose to air. They acted as the gatekeepers of information. They provided their audience with a simple measure of trust.

Decades ago these major publishers were the only game in town. Today, while they still control much of the distribution of information, they no longer have the same control. Instead they act as a trust indicator, just as sites such as Slashdot do. In the end, blogs turn everybody into potential journalists, authors, and artists, and they transform the major media conglomerates from distributors into endorsers of information.

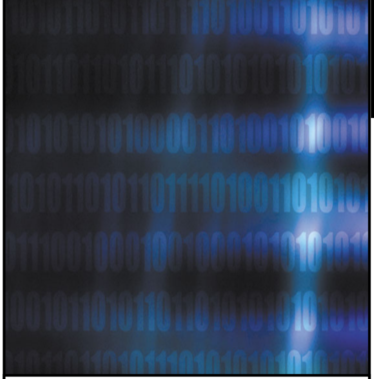
The real question is how long will it be before their endorsement ceases to mean anything? That's completely up to them; how long they will be taken seriously depends entirely on how good of a job they do. If they fail, the spectrum I described above only gets narrower. And that might be inevitable. ■

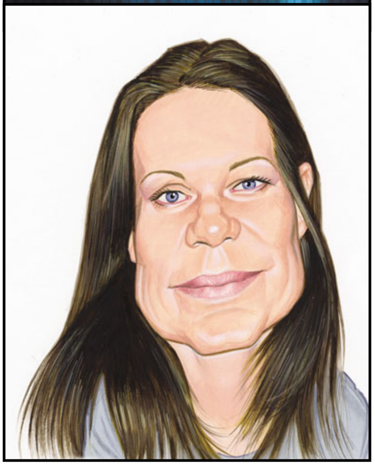
Take your chances with my spam filters by emailing malda@cpumag.com.

Forward Slash

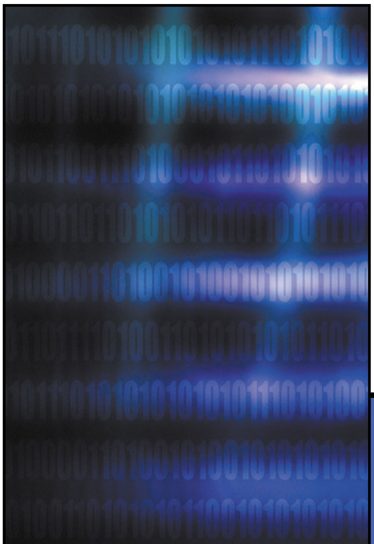
by Joan Wood

The Girls Of Xerox PARC





Starting as gopher for the Emmy-winning team that pioneered live in-car TV cameras for the Indy 500, Joan became an independent video/sound engineer, technical director, and producer. Playing with Reality Engines and motion platforms led to co-founding Xatrix Entertainment, where she produced the two Cyberia games. Before 3D acceleration was trendy, she formed Mango Grits to develop hardware-only game Barrage for Activision. Since cashing out from SharkyExtreme.com, where she was co-founder and managing editor, Joan has retired.



A year ago, I attended an unusual birthday party. Ethernet was turning 30, and some big Silicon Valley companies (3Com, Cisco, HP, and Intel) had ponied up for a day of speeches and panel discussions followed by live music and tasty morsels on the veranda at PARC (Palo Alto Research Center), longtime hotbed of computer technology innovation. Founded in 1970 by Xerox Corporation, PARC saw the invention or adaptation of some nifty items we still use every day, such as the graphical user interface, the laser printer, and the mouse, along with Ethernet. PARC has since contributed to the development of electronic reusable paper, the design of the next Internet Protocol (IPv6), and the Internet worm. The Ethernet@30 event was a benefit for the Computer History Museum, which was recording the day's presentations to be preserved as part of its extensive permanent collection.

> She dreamed of putting a laser printer in every school.

With the "father" of Ethernet (and self-proclaimed master of self-promotion) Bob Metcalfe keynoting the proceedings, it was billed as "both a celebration of history and a look forward to future innovations." After the presentations, I watched along with a few hundred other journalists as those giants of early computer innovation mingled under giant patio umbrellas, catching up and congratulating each other. There was a big cake and plenty of wine to go along with their happy reunions. It was not surprising or remarkable that they were almost all men; it was just a reflection of the times.

As the crowd thinned, I noticed over on the sidelines a smiling woman I'll call Jane. She had been an administrative assistant at PARC from 1974 to 1983 and appeared to have loved every minute. I asked if there had been any female researchers back then. There was one, she said; the rest were all men. There were, however, lots and lots of women at PARC. In fact, the whole support staff was female. Her memories of that time and the pictures she painted for me were fascinatingly different from the numerous published accounts that periodically emerge as the history of Xerox PARC.

She talked about the first laser printer they had. The engineers had built it but were busy and on to other things when it came time for routine operation, so the support staff had to figure out how to use, maintain, and fix it when it broke down. Out of necessity, they even wrote the first user manuals, with some of the women appearing in the final manual photo illustrations to demonstrate proper usage.

They were also using very early word processor prototypes for their normal typing duties and figuring out how to make them work with the networked laser printer—not out of idle curiosity, you understand, but because their jobs depended on it. There was nobody to show them how to do this stuff; they just had to figure it out themselves. Jane recalled the day when someone printed bold text for the first time and everyone ran over to her desk with excitement to find out how she had done it. They just experimented until they figured it out. They were actual users, pioneering user methods.

Jane had far different ideas of how the technology should be developed and marketed, too. She told me that she dreamed of putting a laser printer in every school. She wanted to go into marketing just to tell the world about this incredibly useful invention. It went the other way, though: big, expensive, and marketed to corporations. It would take a decade before low-cost laser printing arrived in schools. It was fascinating to hear things from her perspective.

I've been to a lot of press events, and I've met some pretty impressive people. But I often think of Jane and her colleagues, making small contributions that won't make it into a museum. Happy birthday, Ethernet and thank you, Jane. ■

Send packets to joan@cpumag.com.

by Chad Denton

Road Warrior

Intel Unleashes Dothan, New Palms & PowerBooks, Wireless Beamers & More From The Mobile Front

"I'll Name That Tune For A Buck"

From a technology standpoint, some services from wireless phone companies are cool. From an economic standpoint, some smack of desperation. Case in point: The latest service from AT&T Wireless can identify almost any musical ditty. Users simply dial an ID number and hold the phone next to a speaker for 15 seconds. AT&T Wireless then sends you back a text message identifying the title and performer. You can give the service a free spin, but each subsequent try costs 99 cents. (There's no charge if you stump the system.) The service is kind of cool, and initial reports indicate a high accuracy rating, but we're not sure it's worth a buck per request.

Other services are considerably more useful. The *NewScientist* reports that two researchers at the University of Cambridge are working on a system that can pinpoint a user's location within 1 meter. The user simply takes a picture with a camera phone of a nearby building and submits the image to a database. The database then identifies the cellular base station from which the user sent the image and matches the picture to a nearby building. According to the researchers, the software can identify a building regardless of season or time of day and can even overcome such obstructions as trees and vehicles. Once the software identifies the building, it identifies the user's position and provides specific directions to a destination.

You might be wondering who would possibly pay for this service when GPS is free to anyone with a receiver. Unfortunately, GPS has limitations that make it impractical in some cities. Large buildings can block satellite signals and prevent a GPS receiver from identifying a position. The system is still in the early phases of development, so it's unclear when or if it will become available. ▲

Wireless Beemer

HP and BMW are teaming up to offer a wireless in-car network. Drivers and passengers can connect to the in-car network using Wi-Fi or Bluetooth. GSM and GPRS technology connects the car to the Internet, letting notebook, Tablet PC, and PDA users check their email or surf the Web from the car's back seat. BMW is targeting executives and politicians with the car network, although the company expects the technology to make its way into lower-end models in the near future.

Hmm, no support for EVDO? We wouldn't take one if BMW paid us. ▲

The Good News: Faster PowerBooks; The Bad News: No Mobile G5s

We have a sort of bizarre technolust thing going on with Apple's PowerBook line. Who can blame us, given the PowerBook's unblemished aluminum skin, smooth lines, and, of course, its Unix soul? Apple recently announced an upgrade to its PowerBook line, but unfortunately the upgrade didn't include a much-anticipated G5 model.

The new systems, however, do include faster G4 processors, and 15-inch and 17-inch models come equipped with processors as fast as 1.5GHz. The 12-inch model includes a 1.33GHz G4. The two larger models also come equipped with an ATI Radeon 9700 graphics card with as much as 128MB of video memory. The 12-inch model relies on an NVIDIA GeForce FX Go5200 with 64MB of video memory. All models also include Apple's AirPort Extreme 802.11g mini-PCI card and integrated Bluetooth.

Apple also announced an upgrade to its iBook line. The 12-inch and 14-inch iBooks now come equipped with a 1.2GHz G4 processor and an ATI Mobility Radeon 9200 video chip with 32MB of video memory. AirPort Extreme is optional on all but the high-end 14-inch model. Bluetooth is optional on all models.

Both PowerBooks and iBooks include Mac OS 10.3 and iLife '04. The iLife suite includes iTunes, iPhoto, iMovie, iDVD, and GarageBand. PowerBook models start at $1,599 while iBook models start at $1,099. ▲

Apple hasn't put a G5 under the hood of a PowerBook yet, but the new PowerBook lineup includes a number of new features, including faster processors and integrated 802.11g on all models. (Image courtesy of Apple)

Dothan Finally Arrives

Intel finally launched its next-generation Pentium M processor May 10, releasing three versions at 1.7GHz, 1.8GHz, and 2GHz. In addition to faster clock speeds, the new chips (formerly code-named Dothan) use Intel's 90nm manufacturing technology and include 2MB of L2 cache along with support for a 400MHz FSB. Some experts claim the 90nm process could be a problem for Dothan, as power leakage becomes an issue as transistor sizes shrink. Intel's Prescott, which uses the same 90nm fab process, uses more power than older Northwood processors. If Dothan has the same problem, users may have to give back some battery life gains the original Pentium M offered.

We saw Dothan notebooks running next to Pentium M systems at CES in January, with Intel showing off Dothan's performance gains by running identical graphics-intensive tasks on the systems. Dothan vastly outperformed the Pentium M, although we're sure Intel was careful to put its best foot forward. We're anxious to see how Dothan performs in our labs.

The new Pentium M processors are also the first to use Intel's new naming scheme, which uses an arbitrary three-digit number to convey the processor's family and features. The new Pentium M processors are labeled 735, 745, and 755, respectively.

You can also expect a new chipset from Intel later this year code-named Alviso supporting a 533MHz FSB, PCI Express, DDR2 memory, and support for SATA hard drives. Additional features should further reduce energy consumption. Intel will combine Dothan, Alviso, and its Calexico 2 dual-band Wi-Fi chips to create its next-generation Centrino platform code-named Sonoma. ▲

Falcon Northwest's Gaming Notebook

With Alienware and Voodoo selling gaming notebooks, it was just a matter of time before Falcon Northwest introduced its own high-end model. The FragBook TL is a Centrino-branded model that features Intel's Pentium M mobile processor. The FragBook DR line features desktop Pentium 4 CPUs.

The FragBook TL starts at $2,700 and has a 15-inch display and an ATI Radeon Mobility 9700 graphics chip with 128MB of dedicated memory. Falcon Northwest offers an MSI Wi-FI card in addition to an Intel PRO/Wireless 2200BG card. Both cards support 802.11g, although technically the notebook won't be a Centrino model if you opt for the MSI card.

The DR model has some serious specs, including optional RAID 0 or 1 configurations and desktop P4s, including 2.8GHz, 3GHz, 3.2GHz, and 3.4GHz Northwoods; a 3.2GHz Prescott; or a 3.4GHz Extreme Edition. The system includes a 256MB ATI Mobility Radeon 9700 Turbo and the same wireless options as the FragBook TL. The DR series also sports a 17-inch widescreen display and a price that starts at $3,200. ▲

Falcon Northwest's new FragBook DR line comes with an optional RAID 0 or 1 configuration and desktop Pentium 4 processor.

palmOne's New Zires

Even with a new name, palmOne is still delivering new springtime handhelds. The recently renamed company introduced its Zire 31 and Zire 72 devices in April, and judging from the specs, they look fairly impressive.

Although PalmSource has shipped Palm OS 6 to manufacturers, neither Zire uses the new OS. Instead, both run Palm OS 5.2.8, so they have a lot in common from a software perspective. Both Zires include RealOne Mobile Player 3 for listening to digital music files. Unlike Pocket PCs, however, you'll need an SD or MMC card to listen to digital music. Other features include an updated calendar with a new Agenda view for quickly displaying upcoming events.

The Zire 72 ($299) replaces the Zire 71 (no longer listed on palmOne's Web site). Like its predecessor, the Zire 72 includes an integrated digital camera (1.2MP [megapixels]). It also comes with a 320 x 320, 16-bit transflective display, 312MHz Intel PXA270 processor, and integrated Bluetooth. The Zire 72 is a little larger than the Zire 31, measuring 4.6 inches high x 2.95 inches wide x 0.67 inches deep and weighing 4.8 ounces.

The Zire 31 fills the gap between the grayscale $99 Zire 21 and the high-end Zire 72. The Zire 31 has a 200MHz Intel ARM processor and measures 4.4 inches x 2.9 inches x 0.6 inches and weighs 4.1 ounces. palmOne is a little coy about the Zire 31's display, only saying the device supports thousands of colors. Reports indicate the display looks very similar to the Palm m130's 12-bit display. Furthermore, the 160 x 160 STN backlit display has a lower resolution than higher-end color models. The smaller display size compensates somewhat for the lower resolution, but the backlit STN display completely washes out in direct sunlight. The Zire 31's hardware may not sound too impressive, but at $149 it suddenly becomes more attractive. ▲

palmOne's new Zire 72 (left) offers a 1.2MP (megapixel) camera and integrated Bluetooth, while the company's Zire 31 (right) is a low-cost color Palm.

Compiled by Samit G. Choudhuri & Chris Trumble

At Your Leisure

Plug In, Sit Back & Fire Away

The entertainment world, at least where it pertains to technology, morphs, twists, turns, and fires so fast it's hard to keep up. But that's exactly why we love it. For the lowdown on the latest in PC entertainment, DVDs, consoles, and just stuff we love, read on.

City Of Heroes

A Solid, Polished Superhero-Based MMORPG

There are many gamers who aren't patient enough to pay a monthly fee while waiting for a buggy game to be fixed. Others don't want to spend hundreds of hours building a character.

This is art, but you get a good feel for the epic-style combat the developers are going for.

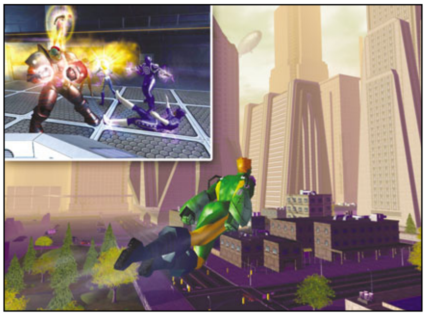
City Of Heroes addresses both issues. Spend all the time you want creating your ultra-custom superhero before setting out to explore the gameworld. You'll find that there's plenty out there for you to discover without having to spend a huge amount of time on the boring, repetitive tasks found in almost all other MMORPGs.

Solo combat is rare, and parties up to eight are possible. A group of heroes with complementary abilities will be able to take on strong adversaries. You will fight and gain enhancements for your character. As far as MMORPGs go, COH is refreshingly enjoyable, but paying $15 per month after the initial 30 days is not. If a monthly fee just isn't your bag, you may consider hunting through the bargain bin for Freedom Force for some solo superhero mayhem. ▲

ESRB: (T)een • NCsoft

$39.99 • PC

www.cityofheroes.com



Admit it, you've always wanted to wear spandex. It comes in handy during combat (inset).

DVD Byte by Todd Doogan

THE DIGITAL BITS
we know dvd
www.thedigitalbits.com

The summer months aren't usually the best months for DVDs. Things get back to normal once the autumn rolls in. June 1 finds Best Actress Charlize Theron in **Monster**. You can also learn about the woman she played in **Aileen: The Life & Death Of A Serial Killer**. Also look for a new edition of **Spider-Man** timed with the theatrical release of the sequel. On the 8th, look for the first season of **The A-Team**, Ben Stiller in **Along Came Polly**, Sean Penn and Tim Robbins in **Mystic River**, and the three **Robocop** films in a handy dandy box. If you're a big Adam Sandler/Drew Barrymore fan, check out **50 First Dates** on June 15. Also be on the lookout for the animated prequel to **The Chronicles Of Riddick: Dark Fury** and the collector's edition of **The English Patient**. For you TV fans, there's **Curb Your Enthusiasm: The Complete 2nd Season, Nip/Tuck: The Complete First Season**, and **The Simpsons: The Complete Fourth Season**. The 22nd is Christmas in June with the release of **Bad Santa: Unrated**. You'll also be happy to know that **Reno 911: The Complete First Season** and the original **The Stepford Wives** also hit the street. Finally, June 29 brings us the comedic **Barbershop 2: Back In Business**, a new special edition of **Blazing Saddles, CSI: Miami–First Season, South Park: The Complete Fourth Season**, and, for the superhero fan who has everything, **Wonder Woman: The Complete First Season**. See? Not a total loss, but nothing to write home about. ▲

Onimusha 3: Demon Siege
Saving The Best For Last

Capcom says Onimusha 3: Demon Siege is the final chapter of its survival-horror saga set in Japan circa the 1500s, and although we’re sad to see Onimusha go, at least Capcom’s sending the series off on a high note. Onimusha 3 is far and away the best game in the series, offering better gameplay and graphics than the first installment and doing away with some of the aggravations of the second one (especially the initially interesting but ultimately vexing barter system).

Instead of sticking with the formula the company used in the first two games (which included static, prerendered backgrounds and the stodgy digital control the company introduced in 1996 with Resident Evil), the last chapter offers up 3D environments that the PS2 renders on-the-fly and an analog control scheme that brings the series into the 21st century. The new graphical digs provide a welcome tradeoff of a greater sense of depth and easier level navigation in exchange for a slightly less polished look, and the new controls make Onimusha 3 quite a bit more fun to play than its predecessors.

Samanosuke and Jacques take the fight to the bad guys in feudal Japan and present-day Paris.

The story once again revolves around the evil machinations of the once-human Nobunaga Oda, a warlord who enlists the aid of dark forces to further his goals of world domination, and the noble warriors who work to thwart his efforts. Samanosuke Akechi, the samurai hero from the first Onimusha game is back (we liked Jubei well enough in No. 2, but we’re glad to see Samanosuke again), and this time he gets some unexpected help in the form of Jacques Blanc, a French tough guy who enters the fray when Nobunaga opens a portal to modern-day Paris. Both characters have a variety of attacks and upgrades via the Oni-powered gauntlets they wear, and Capcom did a decent job of adding modern settings into the mix.

The CG in Onimusha 3 is outstanding, especially the opening sequence, and an interesting story keeps things moving throughout the game; this is easily Capcom’s best release thus far in 2004. ▲

ESRB: (M)ature • Capcom

$49.95 • PS2
www.capcom.com/oni3

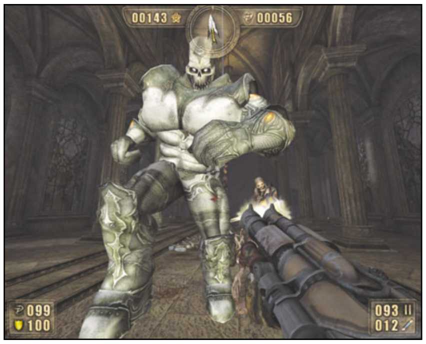
Painkiller
Hell Quaketh For One Man

Your in-game character (Daniel Garner) and his wife (Catherine) are killed in a car crash in the game's intro. Unfortunately, Daniel ends up in purgatory where he's offered a chance to take on Lucifer's army to champion the cause for good. This is his opportunity to be freed from purgatory, so he agrees. Now it's time for you to fight the forces of hell.

The opening cutscene explains the game's premise, but we'll do one better. Painkiller takes you into the old-school FPS realm before complex controls and plotlines entered the picture. Story be damned. Here you take on the army of darkness in order to defeat 26 different types of enemies in your journey to the pearly gates.

You have five weapons at your disposal. Each one features an alternate fire mode, so you essentially have 10 weapons to stave off evil. One is a combination shotgun/freeze gun where you can freeze the first of many enemies at a bottleneck, thus allowing you to pick off the foes in the rear. Expect heavy back-pedaling while firing madly at oncoming creatures. The game plays like Serious Sam and the original Quake because gameplay is focused on the “shooter” portion of FPS and wastes time with little else. This focus pays off because Painkiller becomes a game whose visceral moments can be enjoyed in half-hour or longer increments. You'll forget all your troubles as you get rushed by the masses of Lucifer's imaginative-looking denizens.

Graphics are excellent and can often be unnerving when the evil residents of hell catch you off-guard. The chapter bosses are huge and make you think more strategically when they appear to give you the smackdown. Audio effects are very good, and the heavy-metal soundtrack kicks in when the bad guys are nearby. In all, Painkiller takes pride in not being Half-Life 2 or Far Cry and is a solid old-school shooter for those who miss the old days. Off you go to redeem yourself. ▲



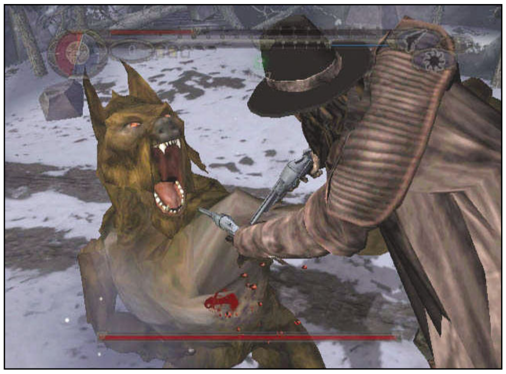
Check out the detail on the big guy when he's not stomping on your head. We saved him for this photo but expect to be mobbed by evil.

ESRB: (M)ature • Dreamcatcher Interactive

$39.99 • PC
www.painkillergame.com

Van Helsing
Devil May Cry Meets Castlevania

We've discussed the perils of turning movie licenses into video games in these pages on numerous occasions, but Van Helsing is a bit of an oddity among movie games in that it may very well be better than the movie it's based upon. The movie, it seems, is a good-looking action fest that doesn't bother too much with developing a cohesive story, and although moviegoers generally frown on such things in the theater, those same qualities translate quite well into the third-person action game genre.



This enormous werewolf is Kate Beckinsdale's brother. Sort of. Expect far more pain as you sit through the film.

In the theater, for example, the inclusion of Dr. Jekyll/Mr. Hyde, the Wolfman, Frankenstein's monster, and Dracula in a single picture leaves the director with painfully little space to really develop any of the bad guys in a meaningful way. In a game, however, such a lineup allows for a level of monster variety that frankly is pretty refreshing. Vivendi plays this to the hilt and adds crisp graphics featuring dark, gothic environments and convincing animation with a pretty good set of controls and an intriguing list of weapons, attacks, and side quests to round it all off.

Throughout the game, we were stricken by Van Helsing's uncanny resemblance to one of our favorite PS2 action games, Devil May Cry. Van Helsing's lead character moves quite a bit like DMC's Dante, including the obligatory double jumps and dive-rolling dodges, and although the weapons list is different due to the game's setting, the variety of weapons and their use is quite similar. Van Helsing also encourages players to collect power glyphs, life meter upgrades, and ammo upgrades along the way, which is strongly reminiscent of collecting orbs of several hues in DMC. You can even save up your power glyphs to buy new weapons and power-ups.

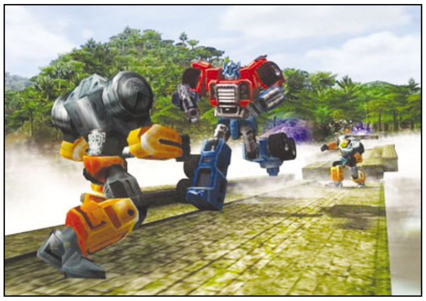
What are we getting at here? Simply this: If you like fast-paced action games, Van Helsing is a blast, whether or not you saw the recent Hugh Jackman flick—and whether or not you liked it. ▲

ESRB: (T)een • Vivendi Universal Games

$49.99 • PS2, Xbox

www.vanhelsinggame.com/us

Transformers
The Return Of Optimus Prime



Optimus lays down the law for a couple of Decepticon minions.

The Transformers were pretty cool back in the day, but things got a little convoluted in the years following the series' heyday in the '80s. More recent versions of the show depicted a cast of Transformers in animal form, and if you didn't keep up on the story, you may have been put off by the seeming lack of continuity. Hardcore fans know that there is, in fact, a common thread that runs throughout every incarnation of Transformers shows, but for more casual observers, the original Transformers (including Optimus Prime and Megatron) are the best. (For more information on the epic tale of the robots from Cybertron, check out "Transformers: The Ultimate Guide," by Simon Furman and published by DK Publishing.)

Considering the source material, it's a no-brainer that a Transformers video game is a great idea. And although Hasbro Interactive released a PlayStation game based on the Beast Wars story line in 1997, this is the first game to feature the old-school robots in disguise.

Atari's take on the Transformers story includes a bit of license but manages to retain the spirit of the series nonetheless. The game pits players as heroic Autobots against the forces of the evil Decepticons in a race to recover and enlist the aid of a lost race of Transformers knows as Mini-cons. Mini-cons are tiny robots whose power lies primarily in their ability to upgrade your Autobot characters' weapons and defensive systems. This idea lets the game progress naturally as players gain access to new attacks and abilities throughout. It also provides a bit of strategy in the form of honing the configuration of your Autobot characters to best fit your style of play and the conditions found in various missions.

The game's graphics are decent, offering a scenic, third-person view of each level and spot-on special effects, including weapons fire, convincing explosions, and (of course) smooth transformation animations. Transformers doesn't reinvent the wheel by any means, but it is a solid action game with a nice, nostalgic tie to a cool '80s cartoon. ▲

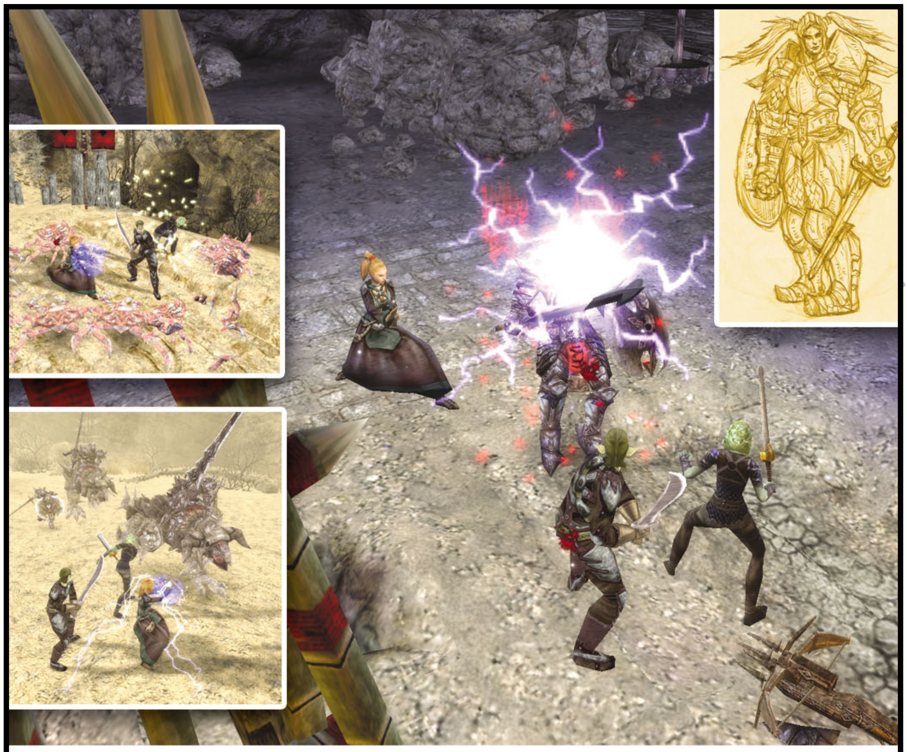
ESRB: (T)een • Atari

$49.99 • PS2

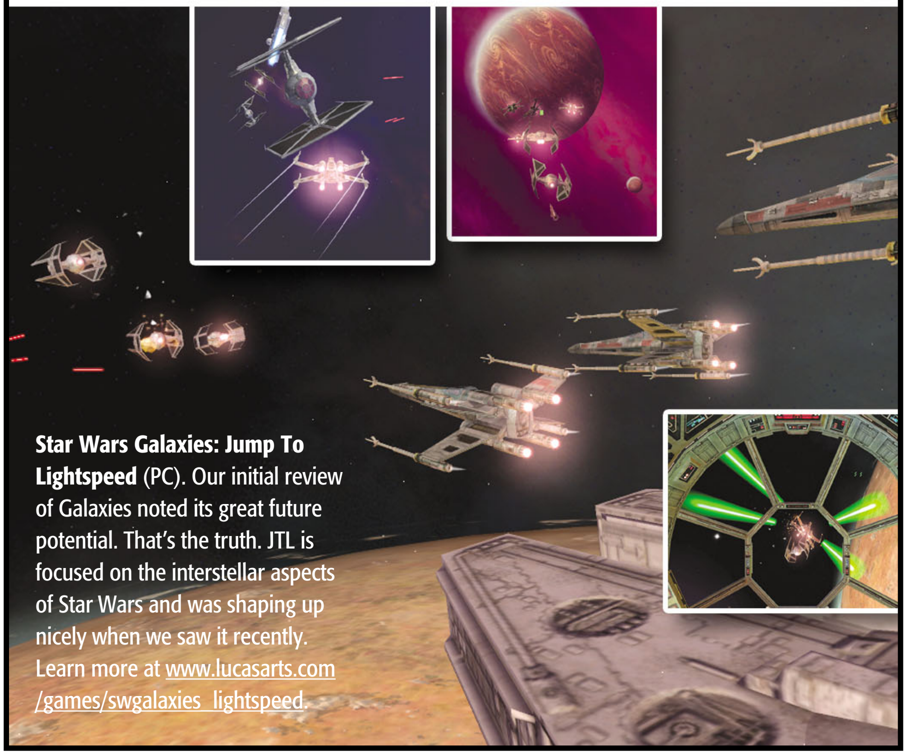
www.atari.com/transformers

Hot Shots: The Beauty Of The Game

Yeah, we know it's all about the gameplay. Sure, there are those who would have you believe graphics are relatively unimportant in the greater scope of things, but if you read *CPU* mag, you probably already know those folks are off their collective rockers. We want great gameplay combined with stunning graphics, and here are two upcoming games that show promise. Watch for them.



Dungeon Siege II (PC). The original DS was released to much fanfare back in 2002. The game garnered critical acclaim but had some gameplay issues that troubled hardcore players. Gas Powered Games listened hard and has returned with what looks to be a solid sequel due for the holiday buying season. Learn more at www.gaspowered.com/ds2.



Star Wars Galaxies: Jump To Lightspeed (PC). Our initial review of Galaxies noted its great future potential. That's the truth. JTL is focused on the interstellar aspects of Star Wars and was shaping up nicely when we saw it recently. Learn more at www.lucasarts.com/games/swgalaxies_lightspeed.

Infinite Loop

These Records Set The High Scores

The impact of video gaming on the entertainment industry is huge. At www.guinnessworldrecords.com, record after record demonstrates how influential the effects have been. Here are some of our favorite high-rankers:

- Sony's PS2 wins the Fastest-Selling Videogame Console title, selling 98,000 units in just four hours on March 4, 2000.
- Since 1983, the best-selling video games (the 26 games featuring Mario) have sold a total of more than 152 million copies. Super Mario Brothers has sold 40.23 million copies the world over. Currently, Nintendo game systems exist in more than 40% of U.S. households.
- Game Boy receives the honor of being the Most Popular Handheld Videogame System, with more than 100 million units sold between 1989 and 2000. This results to, on average, more than 1,000 Game Boys selling every hour for the past 11 years.
- The Dreamcast game Shenmue cost over $20 million to develop, taking seven years to complete and giving it the title of Most Expensive Computer Game Development. ▲

Give *your* car the luxury of satellite navigation.

© 2003 Garmin Ltd. or its subsidiaries

The StreetPilot® III from Garmin has features found in expensive in-dash navigation systems, plus one very important quality the others don't have. StreetPilot III is portable, so you can have the best in GPS navigation in any car you drive. Look up addresses, attractions and other services, and StreetPilot III will create a route and provide turn-by-turn directions with voice prompts to get you there.

StreetPilot III and GPS V from Garmin. Navigation for every car.

GARMIN. www.garmin.com NASDAQ GRMN

Available at: BEST BUY COMPUSA

SOFTWARE TIPS & PROJECTS

Editing Audio Archives

AH, IF ONLY ALL THE WORLD OF ENTERTAINMENT HAD BEEN DIGITAL ALL ALONG, THEN WE WOULDN'T HAVE TO PUT UP WITH THE POPS, CLICKS, AND hisses that still accompany the many audio recordings we digitize to our PCs. Now that MP3 players and jukeboxes have become *de rigueur*, many of us are collecting all kinds of ancient recordings on our PCs to play back while we jog, drive, or just lay in a hammock. Our hard drive is brimming now with old radio programs, comedy stand-up routines, and obscure albums that we converted from their original analog sources to clean digital.

Happily, your PC can clean up a lot of those audio artifacts of the analog age with a few simple tricks. Audio editing and modification is an even more complex affair than video editing, but it is possible to easily do some basic audio track cleanup and rerecording with a host of common programs.

MediaSource Cleanup

If you own a Sound Blaster Audigy card, you already have the most basic restoration tools for purifying noisy tracks in the bundled MediaSource player. Open the program and choose a track to play. Choose EAX Console from the Tools menu and click the Clean-Up tab. Click the Enable Audio Clean-Up checkbox and then use the Audio Source drop-down menu to make sure you are applying the cleanup effects to media files.

The EAX Console offers three types of cleaning: Noise Removal, which suppresses general background noise; Noise Band Adjust for persistent noise at the high or low ends of the sound spectrum; and Click Removal, which minimizes the pops and clicks on old recordings, especially from vinyl LPs. The trick in noise reduction is not to try to process out everything at once and not to overprocess the track.

Use the MediaSource player to start playing the track you need to modify. It's best to start by removing the clicks and pops, so if this is the problem with your track, set the Noise Removal and Noise Band Adjust sliders all the way to the left. Move the Click Removal slider to the right in increments until the pops and clicks become inaudible. The Click Meter on the right indicates the level of noise that you are successfully filtering from the track. Use the meter to determine where you are getting the maximum effect from Click Removal and then don't move the slider any further. This prevents overprocessing.

Many advanced digital audio editors will eliminate only one noise type at a time, make a new recording of the track with that one source removed, and then work on the next source of noise from the newly recorded track. This is because applying multiple effects filters at the same time can produce some horrendous results. So once you have set the Click Removal to the desired levels, you can use MediaSource to rerecord the track. Load the track with the desired Clean-up settings enabled and stop the track from playing. Choose Show Record Status from the View menu. This will change the main window to reveal your recording tools. Test the record levels by playing the track and adjusting the record volume so that the volume levels in the recording window never peak into the red zones. Use the Recording Format drop-down window to set the file format to WAV and the appropriate number of channels, sample rate, and number of bits. (We used Stereo, 44.1KHz, 16 bits.) Click the Record button and then click Play. When the track is finished, click Stop.

WinXP Tip Of The Month

Knowledge Is Power

There are loads of cool PC detectives such as SiSandra that can tell you every imaginable detail about your own PC or one that you may be trying to troubleshoot. But Windows XP has its own very powerful, built-in System Information program that renders highly granular information about the current PC and its Windows configuration. In the All Programs menu, open the Accessories folder, highlight System Tools, and click System Information (or type **msinfo32** in the Run dialog box). The System Information window gives you a system summary of such things as hardware and virtual and real memory. This is also where you can get an overview of how the PC is allocating IRQ and DMA resources and where memory conflicts may be occurring. One of the most useful areas is the Running Tasks item under Software Environment, which gives you a more detailed view of the programs that are loaded into memory and active than you get from the Processes tab in Task Manager. Use the Tools menu to access yet another nest of utilities for diagnosing network problems, adjusting DirectX and driver verification settings, and even creating a log of your boot process with the old Dr. Watson program. ▲

If you need to clean other noise types from the track, load the newly recorded version of the file into MediaSource. To eliminate background noise, such as persistent buzzes or hisses, play with combinations of the Noise Removal and Noise Band Adjust sliders. Try setting one at a low level and experiment with raising the other in increments. This takes finesse because these two controls are most likely to introduce distortion, so try to apply the minimum adjustment.

Riding The Waves

An advanced audio editor such as the popular shareware tool GoldWave (www.goldwave.com) lets you take noise reduction to the next level. Download the program and then open the file you want to clean. The file will appear in waveform in the main window. GoldWave has built-in noise reduction filters that you can apply to parts or all of a track. Use the Effect menu to open the Filter submenu, which contains specific filters for reducing noise and suppressing clicks and pops. For instance, if you click Pop/Click, you can set the degree of reduction in the Pop/Click dialog box. Try somewhere between the default setting of 1,000 and 1,500 for a start and then click OK to apply the filter to the entire track.

If you really only need to apply a filter to an especially noisy patch in a track, then use the mouse to click and drag a box around the troublesome area on the waveform. Use the same filter procedure as above, and the program will apply the noise reduction only to the selected area.

One of the coolest aspects of GoldWave is that it lets you manually edit the waveform of a track, so you can actually visually identify individual clicks and pops and suppress them with the mouse. Watch the progress bar move across a noisy waveform in GoldWave as you play it, and you should be able to see the pops and clicks as radical spikes in the waveform itself. Use the mouse to highlight a spike and then repeatedly zoom into it by either pressing SHIFT-Up arrow about 30 times or choosing Zoom 1:1 from the View menu. Locate the spike and hover the mouse over the waveform line to see it turn to a target-shaped cursor. You can now click and drag the pieces of that spike downward and upward closer to the middle line. This will suppress the pop without interfering with the overall sound track. This is especially effective in a track that has only a few major flaws.

Unlike MediaSource, you do not need to rerecord the track in GoldWave. Once you have made your modifications, choose Save As from the File menu and name the modified file. The Save Sound As dialog box is also where you can convert a large WAV file to a more compressed MP3 file or to any other audio format.

Next month we'll look at more methods for removing noise in these and other new audio-processing products. CPU

by Steve Smith

Garbage In?

If you are recording tracks straight from an old LP or cassette player into your PC, you'll want to use these rules of thumb to help make the digitized files easier to clean:

- Higher is not necessarily better when it comes to dirty audio. Don't record with a sample rate that is higher than necessary.
- If your source media is mono, then record in mono.
- If you are eventually going to take stereo audio sources and burn them to CDs (44.1KHz and 16 bits), then don't record from the original at any higher rate than the final product.
- When recording, set the volume levels so that the peaks never venture into the red zones, which introduces distortion that can amplify audio flaws.
- Finally, avoid recording off of the original directly into a compressed digital format such as MP3 because this, too, can add distortions that may worsen when you apply the digital-effect processing used to clean the noise. Instead, try recording to the WAV format. Make sure you have lots of hard drive space, however. In our tests, a minute of music saved to a WAV file filled more than 10MB.

Registry Tweak

Restore File Protection

Most intermediate and advanced users long ago removed the protection Windows applies to certain folders such as C:\WINDOWS. In a default installation, Windows warns the user about accessing these sensitive folders and keeps them hidden unless the user specifically asks that they be revealed. But once these files are unhidden, how do you restore that original warning if, perhaps, you pass the same machine on to a less experienced user who needs this protection? In the Registry Editor, highlight the HKEY_CURRENT_USER \SOFTWARE\MICROSOFT\WINDOWS \CURRENTVERSION\EXPLORER\WEBVIEW\BarricadedFolders key. In the Value pane, you will see all of the folders Windows can protect, from the root directory to the Program Files and System Files subdirectories. To restore the old protection, double-click the desired folder, and in the Value Data box, change 0 to 1. The effect will be immediate. ▲

Infinite Loop

Foiling Bike Crime

In the Netherlands cycling has always been an important way of life. Particularly in Amsterdam, a city that boasts more bicycles than people, people are passionate about their bikes. So what happens when bike theft becomes rampant? The police step in with secret GPS transmitters. In order to stop increasing bike theft, police are equipping random bicycles with hidden GPS transmitters in areas where bike thefts are most widespread. ▲

Source: CNN.com

WARM UP TO LINUX

Auto-Starting GUI Applications

SOME USERS WANT THEIR PROGRAMS TO AUTOMATICALLY START AS MUCH AS THEY WANT ANOTHER HOLE IN THE HEAD. BUT THERE ARE OTHERS WHO GROW TIRED OF having to go through the same routine whenever they enter their GUI. Some Linux distros offer GUI interfaces that instruct a system to launch specific apps when the user logs in or starts the GUI manually. Typically, the user has to edit some text files to do this. We'll take a look at GUIs and text options available for customizing your startup applications.

In GNOME

GNOME GUI users will find their startup configuration setup in the Sessions Manager. You should find the Sessions tool in the Preferences menu unless your particular distribution has fiddled with the location. With this tool open, select the Startup Programs tab and click the Add button to open the Add Startup Program dialog box.

In the dialog box, either type in the Startup Command text box the command that you want the machine to run when you enter the GUI or click Browse to select the program from within your file system. You might find it handy to use the Search For Files feature in your main menu to determine where a particular program is located.

After the program is selected, adjust the Order box so the system knows when to launch this particular app. The lower the Order setting is, the sooner the application will start. If you want to change the setting later, go to the Add Startup Program dialog box, select the entry you want to alter, and click Edit. You can also select a program and click Delete to remove it from the startup list.

In KDE

As yet, there isn't a GUI tool for adding auto-start programs in KDE, but there's a simple way to set this up. You should have the directory ~/.kde/Autostart. (The tilde [~] refers to your home directory, so if your login is "bob," the path is the same as /home/bob/.kde/Autostart.) This is the directory that KDE looks in as it starts up. You need to create symbolic links (or shortcuts) for the apps you want to start to this directory.

You do this with the ln command. (Type **man ln** at a command prompt for more information.) Let's say you want to launch the Gaim program (a multiprotocol IM client) automatically when you enter the GUI. Type **which gaim** at a command prompt to see where the program is located. Perhaps the location is /usr/bin/gaim. Now type **ln -s /usr/bin/gaim ~/.kde/Autostart** to create the soft link. When you log out of KDE and then back in, Gaim should start automatically.

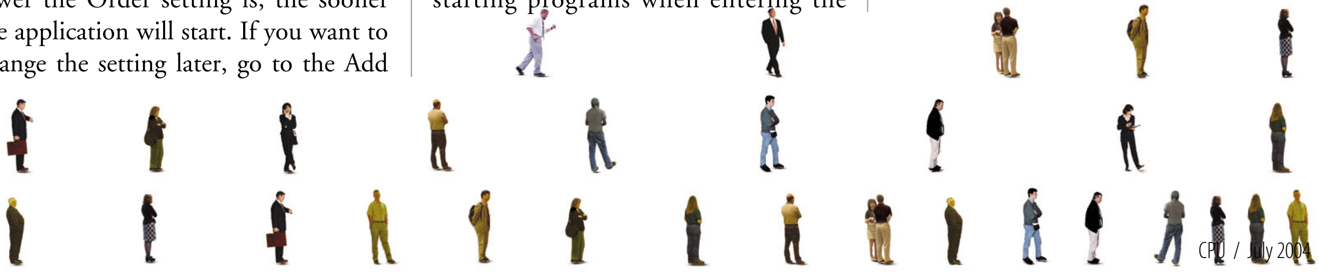
X In General

Users of X also have options for auto-starting programs when entering the GUI. The file you'll need to edit for adding system-wide auto-launchers is Xclients or ~/.Xclients for personal settings. You may or may not already have an ~/.Xclients file. If not, type **chmod +x ~/.Xclients** at a command prompt after you save this file to make sure that it's marked as executable. (The system has to be able to run it as a program.)

Like Multimedia?

Real Media has finally given Linux users a new version of its media player. The player comes from the Helix project (player.helixcommunity.org). The final version should be available this summer. In fact, if you go to the main site (helixcommunity.org), you'll discover there are also open-source components called the Helix DNA (tm) Producer from Real and the community it's enlisted for help that let you serve up streaming media. Of course, not all Linux multimedia comes from Real. Lindows (now known as Linspire due to legal reasons) has released Lphoto—a gorgeous application for managing, publishing, and editing your digital photos—in open source in the hope that other distributions will pick up the program and use it. You can download the source code at www.linspire.com/lphoto. ▲

The Xclients files are shell scripts, which means they're text files full of instructions that you could type at the command line if you wanted to. Because your personal .Xclients file probably doesn't exist, you will need to use a text editor to create it. If the file already



exists, open it to edit it instead. For new files, put the following at the beginning:

#!/bin/bash

This line tells Linux that this is a bash shell script, so you should use the bash program when running the code that follows. Bash is the default shell in Linux. After this, insert your instructions, just as you might type them at the command prompt. For auto-starting graphical programs, you will follow this format for each entry:

command flags &

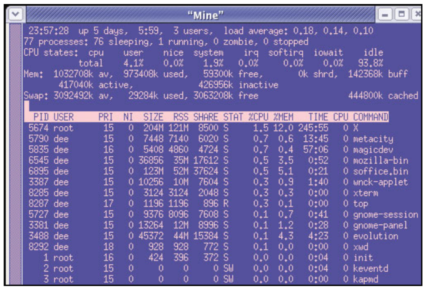
Command is the command name for the program you want to run. Flags are any options you want to assign to this command. The ampersand (&) is a trick used from the command prompt to start a program but release the prompt itself to be used while that program is still running. This technique is referred to as "backgrounding" or "putting a process in the background."

Now that you know how to add an entry, you have to decide what you want to start. In a simple GUI, you tend to need a command line terminal at the very least. The program used for a terminal in X without GNOME or KDE present is typically xterm (which is why you'll often hear a GUI command line window referred to as an xterm). So, your line would start with just xterm. However, if you read the xterm manual (type **man xterm** at a command prompt), you'll find numerous options to control the window's size, position, look, and behavior.

You can launch xterm from any command prompt if you're already in the GUI and experiment with the values. The following is a look at some of the most interesting and useful:

- If your cursor doesn't blink by default and you want it to, type **-bc flag**. You can also control how fast it blinks by typing **-bcf** *# (*where *#* is how many milliseconds the cursor is off during blinking) and by typing **-bcn** *#* (where *#* is how many milliseconds the cursor is on).
- Set your cursor color by typing **-cr** ***color*** (where *color* is the color you want, such as blue). Usually when you highlight text with your mouse, xterm displays the highlighting in reverse video, such as white on black, black on white, and so on. You can specify the highlighting color by typing **-hc** ***color***. Other options include -bd *color* (border color), -bg *color* (background color), and -fg *color* (foreground color, meaning text). For a full list of color names, go to a command prompt and type **man X** to see the X Window System's help information. Now type **/COLOR NAMES** and press ENTER.
- Want to use long scrolling? Add **-sl** *#* (where *#* refers to how many lines you want to scroll at a time; the default is 64).
- To control fonts, type **-fn** *font* to specify the normal font you want. For a full list of font names, type **man X** at a command prompt. You will see the X Window System's help information. Now type **/FONT NAMES** and press ENTER.
- To control the title at the top of your window, type **-title** "***Title***" (where "*Title*" needs to be a single word).
- To run an app automatically when the window opens, type **-e** ***program*** (where *program* is the full path to the program) at the end of the line. For some commands, such as ls, this will make the window close quickly. As an example, type the following at a command prompt:

xterm -bd white -bg blue -fg pink -title "Mine" -e top &



```
 23:57:28  up 5 days,  5:59,  3 users,  load average: 0.18, 0.14, 0.10
77 processes: 76 sleeping, 1 running, 0 zombie, 0 stopped
CPU states:  cpu    user    nice  system    irq  softirq  iowait    idle
           total    4.1%    0.0%    1.9%   0.0%     0.0%    0.0%   93.8%
Mem:  1032708k av,  973408k used,   59300k free,       0k shrd,  142368k buff
       417040k active,             426956k inactive
Swap: 3092492k av,   29284k used, 3063208k free                  444800k cached

  PID USER     PRI  NI  SIZE  RSS SHARE STAT %CPU %MEM   TIME CPU COMMAND
 5674 root      15   0  204M 121M  8500 S     1.5 12.0 245:55   0 X
 5790 dee       15   0  7448 7140  6020 S     0.7  0.6  13:45   0 metacity
 5835 dee       16   0  5408 4860  4724 S     0.7  0.4  57:06   0 magicdev
 6545 dee       15   0 36856  35M 17612 S     0.5  3.5   0:52   0 mozilla-bin
 6895 dee       15   0  123M  52M 37624 S     0.5  5.1   0:21   0 soffice.bin
 3387 dee       15   0 10256  10M  7604 S     0.3  0.9   1:40   0 wnck-applet
 8285 dee       15   0  3124 3124  2048 S     0.3  0.3   0:00   0 xterm
 8287 dee       17   0  1196 1196   896 R     0.3  0.1   0:00   0 top
 5727 dee       15   0  9376 8096  7608 S     0.1  0.7   0:41   0 gnome-session
 3381 dee       15   0 13264  12M  8996 S     0.1  1.2   0:28   0 gnome-panel
 3488 dee       15   0 45372  44M 15384 S     0.1  4.3   4:23   0 evolution
 8292 dee       18   0   928  928   772 S     0.1  0.0   0:00   0 xwd
    1 root      16   0   424  396   372 S     0.0  0.0   0:04   0 init
    2 root      15   0     0    0     0 SW    0.0  0.0   0:04   0 keventd
    3 root      15   0     0    0     0 SW    0.0  0.0   0:00   0 kapmd
```

Fig. 1: This is an example of what you can do with an xterm you start automatically when you log into the GUI.

The results (shown in Fig. 1) are a little loud, but you'll get the idea.

Your Machine, Your Way

It's important your machine is ready to do what you want when you log in. By making sure programs can auto-launch for various users, you save them from tracking things down themselves. CPU

by Dee-Ann LeBlanc

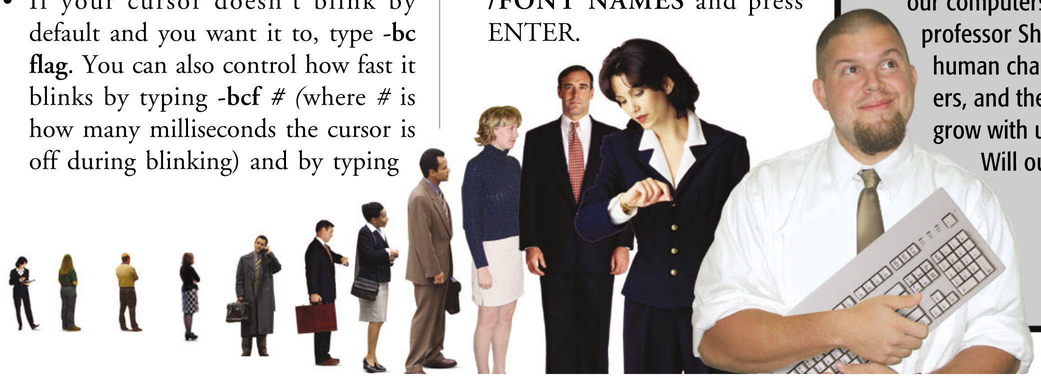
Infinite Loop

Computer Love

Roses are red.
Violets are blue.
I'll love you forever,
Even if I have to wait in line for an hour or two.

It's natural to become emotionally attached to people, pets, and places, but our PCs? In a study done at Penn State University, researchers found that some students were so attached to a particular computer that they would stand in line even when other computers were available. Why do we love our computers so much? According to professor Shyam Sundar, we attribute human characteristics to our computers, and they become "friends" that grow with us. The question remains: Will our PCs love us back? ▲

Source: TheRegister.com



Take the ViewSonic® screen test!

The Tablet PC V1100. More power. More freedom. More style.

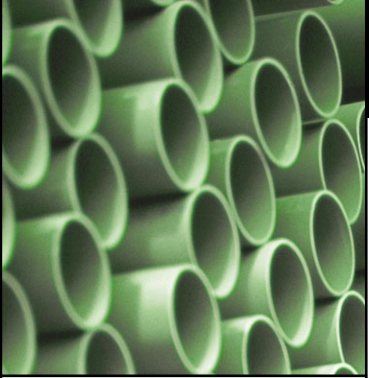
There's a revolution in PC portability that's as important to your freedom and productivity as the cell phone or laptop. The convergence of the PC with high-resolution display technology is realized with power and mobility in the ViewSonic Tablet PC V1100. If your home is often your office and the road is your conference room, the Tablet PC V1100 is the perfect combination of office manager, legal pad, portable desktop, and productivity networking tool. It offers all the functionality of a Windows® Office™ environment in an unobtrusive, ultra-stylish 3.4 pound profile. With a big write-on screen and superior handwriting recognition, the V1100 does much more than a laptop. Take handwritten meeting notes, or sketch big ideas and immediately share them with your team via integrated LAN and Wi-Fi. Any application that runs on a laptop will run on your Tablet PC. Combined with a ViewSonic projector like the new 2.2 pound PJ250 micro-portable, you've got an incredibly powerful mobile presentation solution under six pounds. Take a screen test today at your ViewSonic reseller or visit **ViewSonic.com** and see why the Tablet PC V1100 is a runaway hit.

Add our compact projector for mobile presentations, or with keyboard included and optional dock, the V1100 easily switches from portable to desktop duty.

Freestyle

Specifications and pricing subject to change without notice. All logos, trademarks and registrations are the sole properties of the their respective companies and are used by permission.
Copyright © 2003 ViewSonic Corporation. All rights reserved. [11042-00B 03/03]

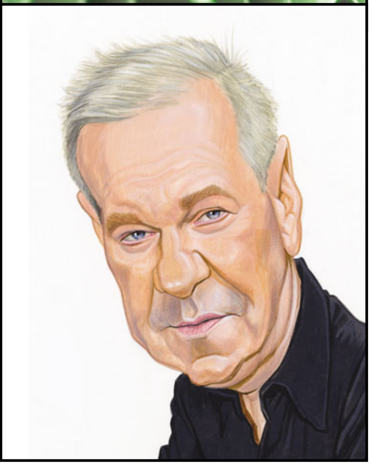
ViewSonic®
See the difference.®



Shavings From The Rumour Mill

by Mike Magee

AMD's Chance To Rake In Money



Mike Magee is an industry veteran. He cut his teeth on ancient products like the Dragon and the Japanese PC platforms long before the IBM-PC won. He worked for a corporate reseller in the mid-'80s and saw the Compaq 386 sandwich box and every GUI known to humankind. Mike decided that the way to go was the Interweb around 1994 after editing PC mags in the late '80s and '90s. A co-founder of The Register, Mike started the chip-driven INQUIRER (www.theinquirer.net) in 2001. He has contacts from top to bottom in the business, spanning the entire chain, who help him root out interesting rumours and speculation.

By the time you read this, Intel will have launched its Grantsdale and Alderwood chipsets, everyone will have reviewed the performance of PCI Express graphics cards, plugged in 4GB of memory, and be using 64-bit Windows for AMD/Intel. Right? As we were going to press, there were already delays on Grantsdale but nevertheless those teething problems should have been solved by now. However, a worrying rumour that reached us now appears to be true: Intel will not continue its Pentium 4 NetBurst core after the Prescott, and as we have hinted before, here many times, will move to the Pentium M platform for both its desktops and its notebooks. This may occur as early as next year, which seems a bit overoptimistic to us. However, word from the engineers at the Intel fabrication plants is that the firm is moving heaven and hell to adapt the Pentium M, probably with multiple cores, as early as sometime next year. That will be faster than AMD can rush out dual core CPUs—the Rumour Mill reckons they'll be out in 2005.

> **. . . Intel is going to reposition its Pentium M CPUs as desktop chips.**

What is a little more worrying is that the current rash of motherboards based on the Grantsdale and the Alderwood chipsets are supposed to keep the industry happy not only during the rest of this year but the next year, too. We're not too sure how this will pan out, but here's what the story is: Intel will very probably re-engineer the current P6 core. The P6 core was used in the late-lamented Pentium III family and then re-engineered to be the Pentium M.

Word on the silicon street is that the skunkworks in Oregon responsible for starting the project to copy AMD's 64-bit X86 technology have already created a 64-bit chip with a Pentium M core and 32-bit compatibility, thus dispensing with all that 16-bit compatibility junk. That 16-bit junk, this old geezer recalls, was leading edge stuff in its day. Removing the 16-bit compatibility will give Intel room to do some interesting things with the Pentium M.

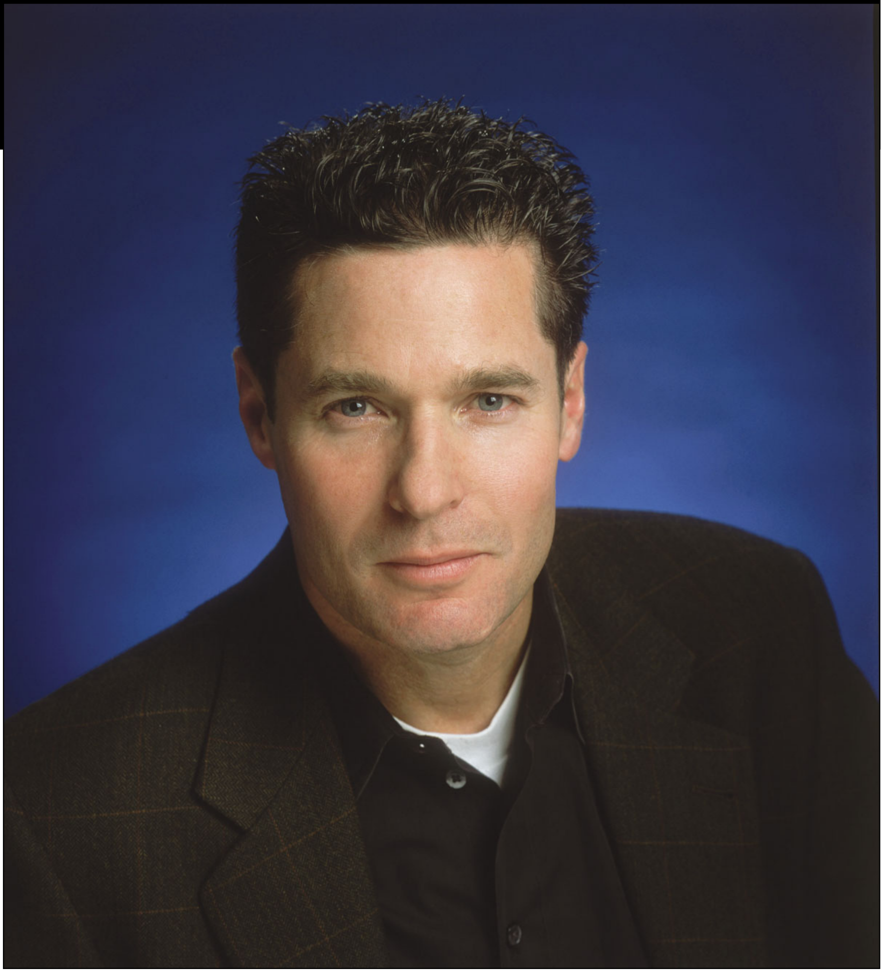
If Intel indeed has a missing link for the next generation of Pentium 4 Netburst processors, this provides a big opportunity for AMD to sell performance Athlon 64s and FX chips. It may not be possible for Intel to get dual core chips out until close to the second half of next year, and the word from AMD is that its shift to 90 nanometers is going at least as well as Intel's. There's little doubt that if Tejas goes, AMD may have the performance lead on Intel for as long as fourteen months.

There's even more in the offing. We could see an Irwindale 2MB 90 nanometer Prescott as early as the first quarter of next year, and Intel plans to displace Mr. Tejas with 65-nanometer Prescotts; maybe it'll do some fun things and compete in raw performance with the AMD chips that will be around at the time.

At the same time, Intel is going to reposition its Pentium M CPUs as desktop chips. Won't we all notice this when it happens? And exactly what message is it sending to power users about which chip is the best chip for the desktop? Is it Master Pentium M or a future slimmed-down Prescott chip? It is little wonder that Intel has started using numbers instead of sheer megahertz and gigahertz figures. It certainly will be a lot harder for us to figure out what's going on if we're faced with a 646 versus a 718 or whatever numbers Intel cares to select. This hasn't been a good year for Intel so far.

The Intel news is disturbing. Will motherboards need to be re-engineered to cope with these chips when they come out? And what about all of the work that Intel's partners (the long-suffering Taiwanese motherboard vendors) have done to develop Tejas-like prototypes? Typically, a motherboard maker takes about four to six months to engineer a board. Intel canned a project codenamed Timna three to four years back only weeks before different motherboard makers were ready to launch their own versions. To say some partners weren't happy then would be to indulge in English understatement. Thank god I'm a Scot. ■

Send rumours to "Mad Mike" Magee at Mike@cpumag.com.



Curt Marvis started out in the film business making nature documentaries, which seems an odd beginning for someone who is currently the CEO of the Internet's premiere movie download service, CinemaNow. From documentaries, Marvis journeyed through producing music videos for MTV and was one of the pioneers in CD content production in the 1990s. Few people have his grasp of what it takes to get multimedia content pushed from development through production and out to the mass market, and he has been instrumental in helping to drag the movie industry from its old "locked vault" mentality into the age of Web-based, on-demand distribution. In the near future, when you're able to download a favorite film and drag it from your PC to your set-top and out to your PDA, Marvis will be one of the handful of people you can thank. ▲

by William Van Winkle

Technically Speaking

An Interview With Curt Marvis, CinemaNow's Main Movie Man

CPU: Tell us about the CinemaNow experience.

Marvis: Fundamentally, we try to make the process of getting to the site, finding a movie, and watching it as simple as we possibly can. After registering and setting up an account, members can watch movies in several ways. We offer progressive downloading, so a cable modem or a decent speed DSL customer could be watching the movie in about 30 seconds while they're downloading. They can stream it, so they can watch it as soon as it's buffered up the speed. And we offer content—not every title, but we offer some of the content in a single pay-per-view model, which means you can rent it and watch it over a finite period of time as much as you want. Or you can be a member of a subscription service, which is an all-you-can-eat model. You could pay anywhere from $9.95 a month up to as much as $99.95 annually for a variety of subscription tiers. Also, with a small selection of titles, which is growing on a regular basis for us, you can actually download and own a movie.

CPU: Is CinemaNow meant to be a desktop experience rather than a living room experience?

Marvis: Not really. I think we're still in the market where most of our users are watching it on the desktop. Or a lot of them are watching it on their laptop. It's just remarkable to me when I fly now how many people are watching movies on their computers. So there's a pretty significant, albeit niche, business of people who download movies and then watch them while they're flying or sitting with their laptop in their dorm or whatever. The last time we did a survey, about 13% to 14% of our users watched CinemaNow movies on their televisions, and they used either an S-Video-out cable or, in some cases, a Wi-Fi connection. My partner, Bruce [Eisen], watches CinemaNow on his home television through SnapStream. I went to his house and saw it the other day. I was blown away. He's sitting in his living room, watching CinemaNow, clicking through that media center interface, and watching the thing just like television.

CPU: He was watching CinemaNow content through SnapStream's software?

Marvis: Yeah. We're actually launching a completely new version at the end of the month which allows you to sit in your living room with whatever PC you've got running SnapStream, turn on your television, and click into CinemaNow so you can watch movies via your remote.

CPU: You can do this because the movies are encoded in Windows Media 9, yes?

Marvis: Exactly. Truthfully, it's a little bit of a kluge right now because of the current Windows Media DRM. But the new DRM that they just announced two weeks ago, Janus, will allow you to move the material from device to device, and that's where the sell-through or download-to-own model can really start to gain some traction. If you download and own content but you can only watch it on the PC you download it to, I won't say it's pointless, but you want to be able to move it.

CPU: So with Janus, someone can copy the file to whichever system or device that he wants?

Marvis: Yes, but what it'll end up doing is disabling it off the previous machine that you've copied it from. You can load content onto your handheld device and then move it back onto the primary device if that's what you choose to do.

CPU: We are fortunate enough to have Comcast On Demand service, which provides movie pausing and a 24-hour rental window direct from the head-end rather than caching to a local set-top hard drive. With increasing features such as this arriving, do you see the cable companies as a threat to Internet movie downloads?

Marvis: First of all, we don't think there's going to be any one company that's just going to rule, nor do I necessarily believe there's going to be one delivery vehicle, be that cable or DSL, which is going to kill everything else. The cable companies have clearly shifted their focus to IP on-demand delivery by virtue of the fact that their biggest profit center is their cable modem business right now, and an area where they want to differentiate is the ability to bring in IP delivered content to the television so that they've got that happening now while the telcos are still figuring out how they want to get there. So we see opportunities in partnering with cable companies that we haven't seen before, as opposed as to seeing them as a threat to us.

Also, I think the best value in our service is the subscription area for the BNC movies. If somebody searches through the library, there's a hell of a lot of movies there that aren't available on television or at Blockbuster that are actually very fun and cool to watch. I mean, that content is everywhere, and you can find it readily available in ways that are probably simpler than CinemaNow. In terms of using it to watch 'Terminator 3,' at this moment in time, it's probably at best a toss up as to whether it's easier to just pick up the DVD and watch it that way. But I think we'll see that change in the immediate future.

CPU: How badly does piracy impact CinemaNow?

Marvis: Piracy is driven by getting something before it can be seen elsewhere. So when 'Van Helsing' comes out in the theaters, it's already been available for a week or two on the Internet. The issue for us is that we don't get new films until the pay-per-view window, which is six to eight months after theatrical release. By that time, if people are really interested in getting 'Finding Nemo' or 'T3' on a pirated basis, they've probably done it.

CPU: What should we look for next in movie downloading?

Marvis: There's not one silver bullet that's going to change all of this and make it happen. It's a whole series of things. There has to be a wider selection and much greater market penetration of the myriad devices that are going to allow people to watch these movies, whether it's PRISMIQ or Ikimbo or Media Center or a networked DVD player that plays Windows Media 9. There are so many devices being worked on right now that I think we'll see a huge shift in the marketplace in terms of availability of those and consumers picking them up over the next 12 months. That device side is critical so we can move away from the 'nobody watches movies on their computer' kind of thought process.

The second thing that's got to happen is bandwidth has to increase significantly so that you can easily download a movie in five or 10 minutes. I just got back from Tokyo, and the bandwidth over there is just insane. We downloaded a studio feature movie from our server here, the 'Looney Tunes' movie—which is two hours long—in 10 minutes. In Japan, the average home has 6 to 10Mb being delivered. 20% of them have 100Mb on fiber. The U.S. is lagging in that regard even though all the cable and DSL players are upping their speeds.

The third thing is that technologies, the DRM and the quality of the codecs and everything, continue to increase. That's obviously important.

The final thing is availability of content. The studios are just starting to free up their content. Two years ago they would not even return our phone calls, and now we're negotiating for all sorts of things with them. I think two years from now, you'll see the numbers of movies and the way they're positioned and how much they cost change pretty dramatically. These are four of the big ones that need to coincide in order for this market to really take off, but I think you'll see that happen over the next year or two. CPU

To read our entire interview with Curt Marvis, go to

www.cpumag.com/cpujul07/marvis.

What's Everyone Talking About?

ComputerPowerUser.com

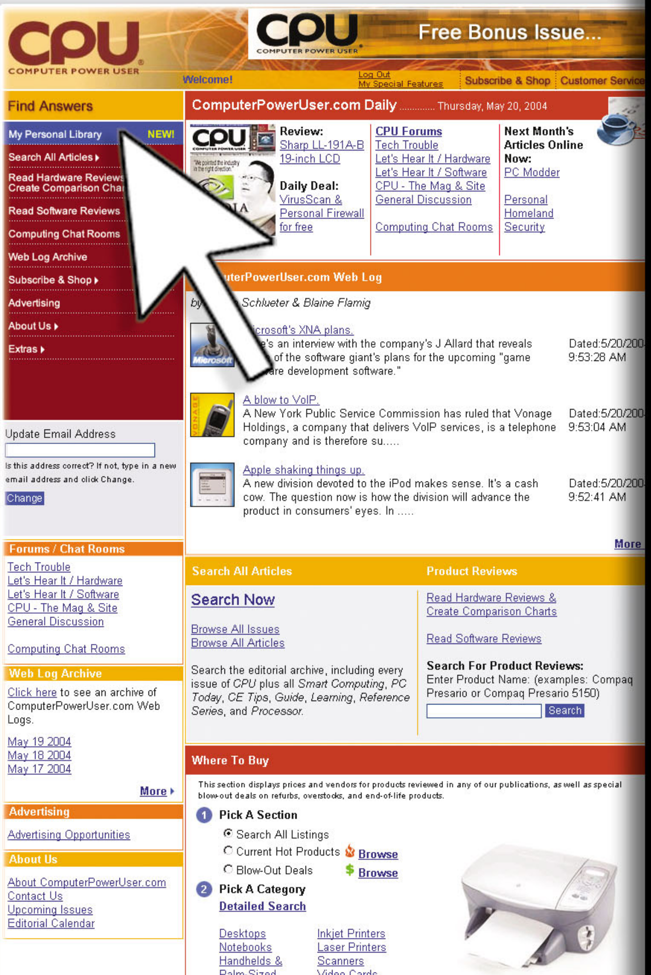
Take Advantage Of All The Extra Benefits Of Being A Paid Subscriber Today!

Here's what's available to everyone:

- The CPU Web Log. Each weekday, our editors scour the Web to bring you the best high-tech (and occasionally offbeat) information in an entertaining way.
- Forums to share (or show off) your thoughts and expertise. Great whether you know it all or want to know more.

Subscriber Tip Of The Month

My Personal Library! Wish you could organize all the wonderful computing articles we give you so that you can form your own library? We're giving you that opportunity! As a subscriber, you will see an Add To My Personal Library link in the upper right of ANY full article from Smart Computing and our sister publications. Click the link to add the article to your library. Create as many folders and store as many articles as you like! Don't forget to check out this great new feature!



ComputerPowerUser.com Daily .... Thursday, May 20, 2004

Review:
Sharp LL-191A-B 19-inch LCD

Daily Deal:
VirusScan & Personal Firewall for free

CPU Forums
Tech Trouble
Let's Hear It / Hardware
Let's Hear It / Software
CPU - The Mag & Site
General Discussion

Computing Chat Rooms

Next Month's Articles Online Now:
PC Modder

Personal Homeland Security

uterPowerUser.com Web Log

by Schlueter & Blaine Flamig

icrosoft's XNA plans.
e's an interview with the company's J Allard that reveals of the software giant's plans for the upcoming "game are development software." Dated:5/20/200 9:53:28 AM

A blow to VoIP.
A New York Public Service Commission has ruled that Vonage Holdings, a company that delivers VoIP services, is a telephone company and is therefore su..... Dated:5/20/200 9:53:04 AM

Apple shaking things up.
A new division devoted to the iPod makes sense. It's a cash cow. The question now is how the division will advance the product in consumers' eyes. In ..... Dated:5/20/200 9:52:41 AM

More

Update Email Address

Is this address correct? If not, type in a new email address and click Change.

Change

Forums / Chat Rooms
Tech Trouble
Let's Hear It / Hardware
Let's Hear It / Software
CPU - The Mag & Site
General Discussion

Computing Chat Rooms

Web Log Archive

Click here to see an archive of ComputerPowerUser.com Web Logs.

May 19 2004
May 18 2004
May 17 2004

More

Advertising
Advertising Opportunities

About Us
About ComputerPowerUser.com
Contact Us
Upcoming Issues
Editorial Calendar

Search All Articles

Search Now

Browse All Issues
Browse All Articles

Search the editorial archive, including every issue of *CPU* plus all *Smart Computing*, *PC Today*, *CE Tips*, *Guide*, *Learning*, *Reference Series*, and *Processor*.

Product Reviews

Read Hardware Reviews & Create Comparison Charts

Read Software Reviews

Search For Product Reviews:
Enter Product Name: (examples: Compaq Presario or Compaq Presario 5150)
Search

Where To Buy

This section displays prices and vendors for products reviewed in any of our publications, as well as special blow-out deals on refurbs, overstocks, and end-of-life products.

① Pick A Section
● Search All Listings
○ Current Hot Products Browse
○ Blow-Out Deals Browse

② Pick A Category
Detailed Search

Desktops
Notebooks
Handhelds &

Inkjet Printers
Laser Printers
Scanners

Only paid subscribers to *CPU* magazine get complete access to all these great features:

Latest Issues. Get a guided tour through the latest editions of our technology publications.

More hands-on hardware reviews. Are the latest products worthy of the marketing hype? We put products to the test, complete with comparison charts and links pointing to where you can buy the products online.

Even more great reading. Our Web site features every article from *CPU* and a searchable archive of more than 18,000 articles from our sister publications *Smart Computing*, *Learning Series*, *Guide Series*, and *Reference Series*. It's like getting five magazines for the price of one!

A showcase of articles from next month's issue. Impress your friends with all the insider information you get by reading *CPU*'s latest articles and product recommendations before they're available in print.

CPU
COMPUTER POWER USER

Under Development

A Peek At What's Brewing In The Laboratory

Berkeley Prof Pinpointing Power Optimum

Energy efficiency is fast becoming the new must-win variable in computer circuitry. Intel has already stated that it's on track to soon exhibit the same energy density on its processor dies as a firing rocket nozzle. Something must be done to help the situation without stifling progress. UC Berkeley professor Borivoje Nikolic of the Department of Electrical Engineering and Computer Sciences is one of the researchers who is zeroing in on an answer.

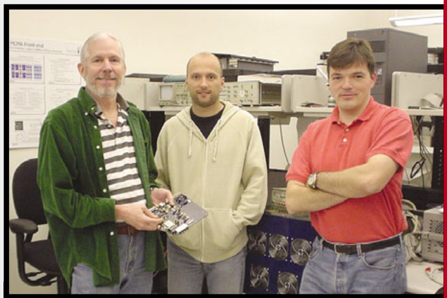
"If you want less cycle time, you have to pay with more power," says Nikolic. "Higher frequencies? More power. However, many of the designs of today and all of the designs of the future will be power limited. We cannot increase the power any more. However, if you're willing to give up a little performance, we showed that with some simple circuits, such as adders, you can sacrifice 5% to 10% in performance but knock down 20% to 50% of the power."

Nikolic is in pursuit of "energy-performance optimization," essentially the perfect compromise value between energy and performance. His team is developing software that analyzes chip designs and identifies the ideal trade-off values. In one demo, the group showed that with optimized transistors and two supply voltages inside an integer execution unit the group could sacrifice about 8% of performance but save about 35% on energy consumption.

Nikolic says a key ingredient in achieving optimized designs is keeping the power increase-to-performance gain ratio constant across all processor parts. Chip makers have been able to do this in past years by shrinking fab processes, down to today's 90nm process. Nikolic says soon designers won't be able to keep that ratio constant. One solution, he says, is to "widen the machine, like with parallel processors," allowing for a reoptimization of the technology.

If this sounds like what Intel is pursuing with its Centrino platform, the coincidence is not lost on Nikolic. "A few years ago, I went to Intel and talked to them about these optimization approaches, and they weren't really receptive because they said that such a machine could not be marketed. Now, they're saying they've been doing this for the last few years. IBM was much more receptive, especially the guys in Austin working on the cell processor. . . ."

Nikolic is bringing his team's software tool efforts to bear in a partnership with IBM with the goal of designing a new energy-optimized floating-point unit. Among other things, the FPU is critical in graphics applications, such as 3D modeling and gaming. ▲



Professors Bob Brodersen (left) and Borivoje Nikolic (right), along with grad student Dejan Markovic, pose amongst test gear at UC Berkeley. The trio is working to find the ideal compromise between power and performance in tomorrow's computing components.

Next-Gen ODD Meets Old-Fashioned Paper

Sony and Toppan Printing have devised a 25GB disc made primarily from paper for use with Blu-ray optical drives.

In a weird spin for optical storage, Japanese companies Sony and Toppan Printing have developed a new type of media for use in the upcoming wave of blue laser-based optical drives. The disc will hold 25GB of data, and paper will make up 51% of its total weight. The plastic platters are able to hold five times more data than conventional DVDs (enough for two hours of high-definition video) because blue laser wavelengths are significantly shorter than the conventional red lasers used in DVD drives.

The change to paper is expected to help lower the manufacturing costs. Additionally, Toppan has noted that because discs can be easily cut with scissors, secure disposal is much simpler than with today's media. The paper discs are one variety of Blu-ray disc media. Blu-ray is a blue laser format backed by Sony, Matsushita, and Philips. Sony is expected to have released its first Blu-ray drive for corporate markets, with an estimated drive price of around $2,500, by the time you read this.

The optical media industry currently cranks out roughly 20 billion discs every year. Whether environmentalists will switch from objecting about excessive discarded plastic to cutting down trees to make optical media still remains to be seen. ▲

by William Van Winkle

Seagate's HAMR To Pound Storage Barriers

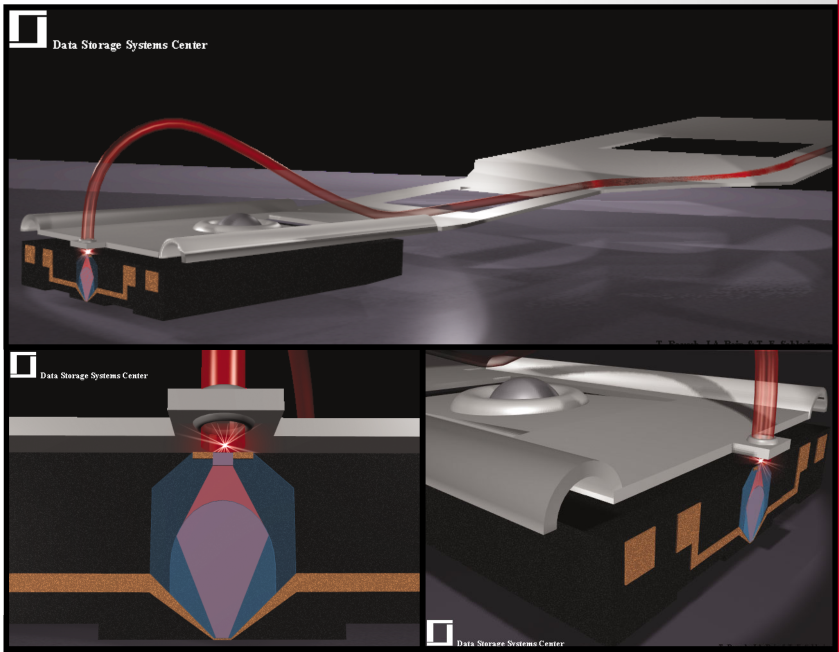
The pending move from lateral to perpendicular hard disc recording, which promises to double storage densities from the present more than 60Gbpsi and yield 1TB hard drives has us excited. But this may look like a drop in the bucket if Seagate's HAMR (Heat Assisted Magnetic Recording) technology takes off.

The HAMR concept started floating around publicly in 2002, yet it wasn't until recently that Seagate presented research findings to the American Physical Society, announcing it expects HAMR technology to enable areal densities of 50 to 100Tbpsi. Seagate notes that a hard drive with such densities could hold 2,800 audio CDs, 1,600 hours of television content, or the entire printed holdings of the Library of Congress on a platter the size of a half-dollar coin. Implications for tiny devices using 1.8-inch platters, such as Apple's iPod, are huge.

One of the key barriers in magnetic storage is the "superparamagnetic limit," a point at which bits are crammed together so tightly that their physical properties interfere with one another, causing bits to flip and thus data to corrupt. HAMR works by using a laser beam or similar energy mechanism to heat the recording medium while bits are being recorded.

"Today, it is not thought possible to be able to alter the bits solely using magnetics when considering high areal densities of many terabits per square inch," says David Szabados, Seagate's senior PR manager for emerging technologies. "So scientists have discovered that if they apply heat to a particular bit, the bit will temporarily destabilize and the data can be written to—or the bit 'flipped'—much more easily by the head using an appropriate magnetic field. Also, by using a targeted heat source such as a laser, the data can be written onto the bit without impacting any of the others on the media. Once the data has been written, the laser or other heat source used is turned off and the bit stabilizes."

The hardest part is the waiting. HAMR technology is not expected in commercial products until 2010, and initial release densities will only be about 1Tbpsi. Given that today's approximately 70Gbpsi platters yield 400GB drives, the debut HAMR drives should hit about 5.7TBs in capacity. ▲


Data Storage Systems Center
Data Storage Systems Center
Data Storage Systems Center

Seagate's HAMR technology will employ a laser alongside a magnetic head to achieve data densities in excess of 50Tbpsi in the coming decade.

802.11 To The Nth Degree

Most of the market is busy making the jump from Wi-Fi (802.11b) to 802.11g, but Intel is already working toward 802.11n and what promises to be a major speed jump in wireless networking. Intel R&D teams are pushing hard to have a final spec for 802.11n in place by late 2005 so that product can be available by 2006. The expected speed rating is 200Mbps.

"One of the reasons we're doing this is because of the need to transmit high-quality video streams in the home," says Manny Vara, Intel Research spokesperson. "802.11g can handle one stream, but if you have a media server PC that can stream to any display in the house, you could have several people needing high-def streams simultaneously, and each of those HDTV streams is 25Mbps. We expect 802.11n to yield about four times the effective throughput of 802.11g."

The 802.11n spec is expected to work on the increasingly crowded 2.4GHz radio band and be backward compatible with 802.11b/g gear. Like 802.11g, 802.11n's reception range is targeted at about 300 feet.

Vara says Intel researchers are working in three areas to enable 802.11n's speed increase. The first is using "smart" antennas for increased range and signal integrity. Most notebooks have one antenna built into the lid, but smart antennas use multiple antennas. The client adapter actively monitors which antenna has the strongest link back to the access point and switches on the fly for the best connection.

Another innovation is the use of advanced FEC coding. This provides for the combination of sideband frequencies to provide additional signal strength and coding gain. Additionally, Vara says that changes are being made to the MAC to help with throughput and handling coexistence with current standards.

Intel expects real-world throughput for 802.11n to hit around 100Mbps. This will be a native speed, not a bonded "turbo" mode as with today's 802.11g gear that advertises 108Mbps but achieves substantially less. ▲

Q&A With CliffyB

Stare into his 29-going-on-19 face in the dozens of self-posted pictures at his site, and Cliff Bleszinski's steely, squinty gaze seems to slide one step beyond cold analysis and into impish self-satire. He is one of the titans of the computer gaming world, yet he describes himself as a master of pop culture. In the end, CliffyB, undeniable genius of the Unreal universe and lead designer at Epic Games, is a regular guy gifted with a fearsome imagination and the need to build his life around making work and play indistinguishable.

Q What do you do job-wise on a daily basis?

CLIFFYB: I'm writing scripts. I'm writing action sequences. I'm creating characters. I'm creating creature ideas, working with the programmers on what the artificial intelligence is going to do. [I'm] maintaining the integrity of the Unreal universe and the Unreal franchise while creating new ones. And at the end of the day [I'm] being a play tester, picking up a game and feeling what feels good and giving my two cents on it.

Q What do you want to accomplish in your gaming career?

CLIFFYB: I believe that we are going to be the most influential entertainment form of the next 100 to 200 years. It's cool to watch James Bond on the screen, but what's cooler than being James Bond? We're in the business of delivering the dream. Hollywood shows you the dream; we put you in it.

Q Can violence in games really erode our cultural values?

CLIFFYB: Everything in moderation, I believe. If you're a person who only watches nasty horror movies or pornography all day long, then something's clearly not right with you. We're the new Elvis, the new Dungeons & Dragons, the new Judas Priest. The previous generation that didn't grow up with video games sees them as this powerful cultural force, and it scares the hell out of them. They don't understand it. They don't actually play the games. So now your average gamer is about the age of 30. He's got one or two kids now and will be raising his kids on video games, teaching them what's good and what's bad. I think you'll see these fears alleviate as time goes on. We're the new "big bad" that parents look for in the way of a quick fix as to what made Billy go crazy, right? Well, people were going crazy long before video games.

Q With little or no engaging graphics, most early adventure gaming took place inside your head. Now, looking at the incredible, immersive visual experience we get with modern games, do you think we've disengaged the user's imagination at all from the gaming process?

CLIFFYB: Absolutely not. I think old games suck. I mean, you can go back and play Ms. Pac-Man for 10 minutes, and it's boring. Old video games are great for nostalgia and the iconology of that pixelated look and the bloop-bloop-bloop sounds you hear integrated into rap music now. But let's face it. That stuff is nowhere near as engaging as the games you have now with full voice-over and an emotional response and the proper physics. A lot of critics act like graphics don't matter. Don't kid yourself. Graphics absolutely matter. For the first 25 years, graphics sucked. Now, when a person comes up to you and smiles, it looks really believable. It's the most exciting time ever for the industry.

Q Are there things about modern gamers' expectations that you find exciting or frustrating?

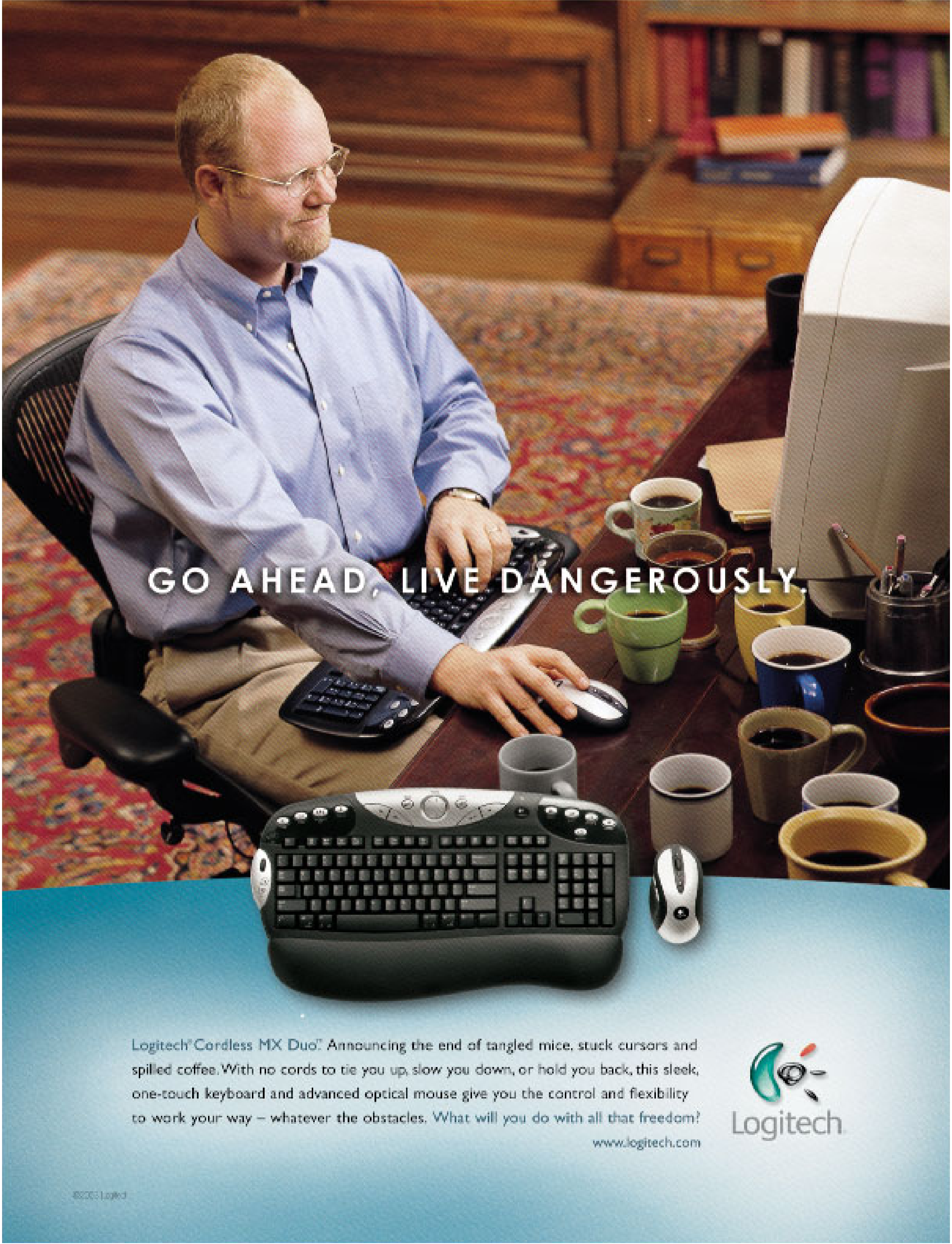
CLIFFYB: If you go to your average movie, it's like $10 for an hour and a half to two hours. If you look at the gaming experience, you spend $40 or $50 a game and you get 100 hours. There's a ratio there that's out of balance. I would love for somebody to release a game for $19 that takes four hours to complete, but it's an amazing four hours. If we can train gamers that less is more, if you have a more compact, memorable experience, you're going to be more likely to finish the experience and possibly even replay it.

Q With skyrocketing game development costs, is that feasible?

CLIFFYB: I don't know. I can dream, can't I? But as a developer, you can come out with a sequel six months later utilizing similar assets. You could release more games in a more episodic manner. People have been talking about this for a while, but no one's had the huevos to accomplish it yet.

Subscribers can see www.cpumag.com/cpujul04/cliffyb for more interview text.

William Van Winkle began writing for computer magazines in 1996. He was first published in 1990, the same year he took his first job in computers. He and his family live outside Portland, Ore.



Logitech® Cordless MX Duo™. Announcing the end of tangled mice, stuck cursors and spilled coffee. With no cords to tie you up, slow you down, or hold you back, this sleek, one-touch keyboard and advanced optical mouse give you the control and flexibility to work your way – whatever the obstacles. What will you do with all that freedom?

www.logitech.com

Logitech

©2003 Logitech

MAXIMUM PERFORMANCE

NOMINAL PRICE

Now take advantage of the superior performance of AOpen's® new 8X DVD +/- RW drive at an amazing price!

AOpen – the world's leading PC component manufacturer – has pulled-out all the stops with this new feature-loaded, dual-format DVD burner. It not only writes both DVD+R and DVR-R media at true 8X speeds, it also serves as a handy, fast and convenient CD media writer and player. It may be a record-breaker, but there's one thing the DWR8800 DVD Burner is NOT, and that's a budget-breaker.

Experience the new 8X DVD+/-RW Burner from AOpen

With extra goodies like Ahead's *Nero Burning ROM, InCD, VideoStudio 7,* CyberLink's *Power DVD* and 321 Studios' *DVD X Copy* (trial version) – you'll make movies, author professional-caliber DVDs and efficiently manage all your media storage needs – all with one nifty package.

It's fast. It's reliable. It's affordable. It's the AOpen DWR8800 8X DVD Burner. Maximum performance. Nominal price.

AOpen®

www.aopen.com
1-888-97-AOpen

© 2004 AOpen America Inc. All rights reserved. AOpen is a trademark and the AOpen logo is a registered trademark of AOpen Inc.
All other trademarks are the property of their respective owners.